ACCT 200  SURVEY OF ACCOUNTING  4
Survey of financial and managerial accounting concepts for the non-business major. Students learn about financial statements for merchandising, manufacturing, and service companies. Topics include: accounting cycle, budgeting, standard costing, contribution margins, cost-volume-profit analysis, and decision making.
RESTRICTIONS: No credit granted for majors within the accounting or business degree programs.

ACCT 207  ACCOUNTING I  3
RESTRICTIONS: Not open to freshmen.

ACCT 208  ACCOUNTING II  3
Introduction to managerial accounting. Topics: manufacturing accounting, cost-volume-profit analysis, job-order accounting, budgeting, standard costs and variance analysis, contribution approach to decision analysis, absorption and variable costing.
PREREQ: ACCT207. RESTRICTIONS: Not open to freshmen. Requires a grade of C- or better in ACCT207.

ACCT 302  ACCOUNTING INFORMATION SYSTEMS  3
Accounting information and its place within an organization's overall management information system. Emphasis on information and document flow, internal control, data organization, and analysis, design, development, and audit of computer-based accounting systems. Includes some computer work.
PREREQ: ACCT208, MISY160 or CISC101. RESTRICTIONS: Requires sophomore status.

ACCT 305  INFORMATION SECURITY AND RISK MANAGEMENT  3
Introduction to the management of information security and risk at both the personal and enterprise levels. Topics include viruses, hacking, cyber warfare, mobile security, social networking, denial-of-service, cloud computing, and risk assessment.
Crosslisted with MISY305. PREREQ: MISY160. RESTRICTIONS: Not open to freshmen.

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 sophomore status.

ACCT 316  INTERMEDIATE ACCOUNTING II  3
Continuation of ACCT315. Topics include: recognition and measurement of investments, long-term liabilities and stockholders' equity; dilutive securities and earnings per share calculations; revenue recognition; accounting for income taxes, pensions and leases; accounting changes and error analysis; financial reporting and changing prices; preparation of the statement of cash flows; and disclosure requirements in financial reporting.
PREREQ: ACCT315. RESTRICTIONS: Requires junior status and a grade of C- or better in ACCT315.

ACCT 337  COST ACCOUNTING  3
Process, job order and standard costing; variable and absorption costing; budgeting, decentralization, and transfer pricing; and cost analysis for managerial applications.
PREREQ: ACCT208. RESTRICTIONS: Requires sophomore status.

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

ACCT 351  BUSINESS LAW II  3
Covers variety of areas of law, including agency, partnerships, corporations, unfair competition, debtor-creditor relationships, bankruptcy, secured transactions, real and personal property, wills and trusts.
PREREQ: ACCT350. RESTRICTIONS: Requires junior status.

ACCT 352  LAW AND SOCIAL ISSUES IN BUSINESS  3
RESTRICTIONS: Not open to accounting majors. Requires junior status.

ACCT 363  SERVICE LEARNING AND EARNED INCOME TAX CREDIT  1-3
Requires 8-12 hours of training in tax preparation for people with incomes low enough to qualify for the EITC (Earned Income Tax Credit). In addition, at least 34 hours of service preparing returns for this type of taxpayer is expected.

ACCT 364  ACCOUNTING IN PRACTICE  1-3
Requires at least 120 hours of an accounting-related internship with verification by the hiring company. Term paper relating the real-world duties and experiences of the internship to principles learned in traditional accounting courses also required.
PREREQ: ACCT315, ACCT327. RESTRICTIONS: Requires permission of instructor.

ACCT 366  INDEPENDENT STUDY  1-6

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

ACCT 410  THEORY OF EXTERNAL REPORTING  3
Covers the traditional model of accounting for information users external to the firm as well as modern descriptive research. Examines institutional environment and impact of the organization on development of accounting theory and practice.
PREREQ: ACCT 316. RESTRICTIONS: Accounting junior or senior status.

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

ACCT 414  ADVANCED FEDERAL TAXATION  3
Advanced federal tax concepts including income taxation of corporations, partnerships, estates, and trusts as well as wealth transfer taxes (Estate and Gift Tax).
PREREQ: ACCT413.

ACCT 415  ADVANCED ACCOUNTING  3
Introduction to branch accounting, consolidations, partnerships, fund accounting for state and local governments, and accounting for international transactions. Other relevant topics may also be covered.
PREREQ: ACCT316. RESTRICTIONS: Requires senior status and a grade of C minus or better in ACCT316.

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

ACCT 418  ESTATE PLANNING  3
Focuses on the efficient conservation and transfer of wealth. Studies the legal, tax, financial, and non-financial aspects of this financial planning process, covering topics such as trusts, wills, probate, advance directives, gift planning, wealth transfers, and related taxes.
PREREQ: ACCT 350 or ACCT 352.

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

ACCT 457  LEGAL ISSUES FOR ENTREPRENEURS  3
Explores important legal issues faced by entrepreneurs as they put their ideas into action. Topics are sequenced to mirror the entrepreneurial process, beginning with pre-startup issues like partnership agreements and intellectual property, continuing to entity formation, governance and ownership issues, and ending with emerging growth and exit transactions.
Crosslisted with ENTR457.

ACCT 466  INDEPENDENT STUDY  1-6

ACCT 483  INTRODUCTION TO INTERNATIONAL ACCOUNTING  3
Describes the functions of international accounting; foreign currency transactions, financial statement translation, inflation, auditing and taxation. Current issues are covered as appropriate.
PREREQ: ACCT207.
ACCT 516 SEMINAR-INTERMEDIATE TOPICS 3
Provides a foundation for knowledge as professional accountants in intermediate financial accounting topics under US GAAP. Material included goes beyond the basics for analyzing and recording advanced accounting transactions.

ACCT 614 ADVANCED FEDERAL TAXATION 3
Introduces master's student to techniques and tools of technical tax research. Advanced federal tax concepts including income taxation of corporations, partnerships, estates, and trusts as well as wealth transfer taxes (Estate and Gift Tax).
PREREQ: ACCT414 or comparable undergraduate accounting course.

ACCT 618 ESTATE PLANNING 3
Focuses on the efficient conservation and transfer of wealth. Studies the legal, tax, financial, and non-financial aspects of this financial planning process, covering topics such as trusts, wills, probate, advance directives, gift planning, wealth transfers, and related taxes.
PREREQ: ACCT350 or ACCT352 or equivalent.

ACCT 657 LEGAL ISSUES FOR ENTREPRENEURS 3
Explores important legal issues faced by entrepreneurs as they put their ideas into action. Topics are sequenced to mirror the entrepreneurial process, beginning with pre-startup issues like partnership agreements and intellectual property, continuing to entity formation, governance and ownership issues, and ending with emerging growth and exit transactions. Crosslisted with ENTR657.

ACCT 800 FINANCIAL REPORTING AND ANALYSIS 3
Surveys concepts underlying financial accounting and external reporting. Provides an understanding of accounting methods, standards, and terminology so that students can interpret and evaluate financial statements. Students are encouraged to participate in class and group discussions involving contemporary investment issues and decisions.
RESTRICTIONS: Not open to M.S. in Accounting students.

ACCT 801 MANAGEMENT ACCOUNTING AND CONTROL 3
Examines the use and impact of accounting information on decision making and strategic choice and on the role of information in organization control.
PREREQ: ACCT800 or equivalent and FINC850.

ACCT 804 DATABASE DESIGN, NETWORKS AND IMPLEMENTATION 3
Covers the design and implementation of enterprise databases in a business environment. Special consideration will be placed on issues related to systems in a networked setting, including current topics related to the management and implementation of databases in such systems.
RESTRICTIONS: Open to business and accounting graduate students only.

ACCT 805 CURRENT ISSUES IN MANAGEMENT INFORMATION SYSTEMS 3
Addresses current information technology challenges facing today's corporate management. Although content will constantly change to reflect current technology and emerging issues, topics include: ethics, management of the impact of new information systems on corporate environments, implementation issues, and changing systems in a global environment.
RESTRICTIONS: Open to business and accounting graduate students only.

ACCT 806 SYSTEMS ANALYSIS, DESIGN AND IMPLEMENTATION 3
Explores the management, organizational and technical challenges of developing systems. Analyzes business processes within a data-driven development methodology. Students will elicit requirements, weigh alternatives and design and implement solutions. Data, process and object modeling will be covered.
PREREQ: ACCT804 RESTRICTIONS: Open to Master Students in Information Systems & Technology Management, Accounting, and MBA majors with a concentration in Information Technology.

ACCT 810 THEORY OF EXTERNAL REPORTING 3
Study of contemporary models of accounting for information users external to the firm. Includes an examination of the institutional environment and the impact of the institutions on the development of accounting theory and practices.
PREREQ: ACCT316

ACCT 811 ADVANCED MANAGEMENT ACCOUNTING 3
Examination of concepts and rationale underlying managerial accounting methods. Advanced topics in decision analysis, standard costing and performance measurement.
PREREQ: ACCT327

ACCT 812 CORPORATE TAX PLANNING AND DECISION MAKING 3
Topics include gross income; business deductions and credits; taxable entities; special limitations on business and passive activity losses; compensation planning; tax factors in the acquisition; use of the disposition of fixed assets; nontaxable transactions; and family tax planning.
RESTRICTIONS: Not open to students with prior tax courses.

ACCT 817 INFORMATION TECHNOLOGIES AUDIT 3
Analysis of current and prospective developments in professional auditing. Topics include auditing computerized systems and the use of statistical sampling by the auditor.
PREREQ: ACCT417

ACCT 820 FINANCIAL STATEMENT ANALYSIS 3
Examines financial statements using contemporary analytical approaches such as regression analysis and ratio analysis. Focuses on accounting and financial implications of business strategy. Crosslisted with FINC250.

ACCT 840 CONTEMPORARY ISSUES IN ACCOUNTING 3
Selected problems of current interest to the accounting profession.
PREREQ: ACCT316 and ACCT327 RESTRICTIONS: Requires permission of instructor.

ACCT 857 PRIVATE EQUITY & VENTURE FINANCE 3
Understanding of economic role of private equity and venture capital, the structure of the industry, and the forces that shape its development. Develop analytical deal-structuring techniques, interact with private equity professionals, and learn about unique risks of private equity investing. Crosslisted with FINC857.
PREREQ: ACCT800 or FINC850 or equivalent.

ACCT 868 RESEARCH 1-6

ACCT 883 INTERNATIONAL ACCOUNTING 3
Describes functions of international accounting: foreign currency transactions, financial statement translation, inflation, auditing, and taxation. Comparative approach is stressed. Current issues are covered as appropriate.
PREREQ: ACCT800 or ACCT316.

AFSC 110 FOUNDATIONS OF THE UNITED STATES AIR FORCE I 1
Survey course which briefly covers topics relating to the Air Force and defense. Focuses on the structure and missions of Air Force organizations, officerhood and professionalism. Introduction into the use of communication skills.

AFSC 111 FOUNDATIONS OF THE UNITED STATES AIR FORCE II 1
Continuation of AFSC110. Survey course which briefly covers topics relating to the Air Force and defense. Focuses on the structure and missions of Air Force organizations, officerhood and professionalism. Introduction into the use of communication skills.

AFSC 150 INITIAL MILITARY TRAINING I 0 PF
This course (to be taken in conjunction with AFSC 110 and AFSC 111 respectively) is a weekly laboratory that touches on the topics of Air Force customs and courtesies, health and physical fitness, and drill and ceremonies.
COREQ: AFSC110. RESTRICTIONS: Open to freshmen and sophomores.

AFSC 151 INITIAL MILITARY TRAINING II 0 PF
Continuation of AFSC150. Provides instruction on the ROTC program and an overview to Air Force skills and life.
COREQ: AFSC111 RESTRICTIONS: Open to freshmen and sophomores.

AFSC 210 EVOLUTION OF UNITED STATES AIR AND SPACE POWER I 1
Survey course focused on the beginnings of manned flight and the development of aerospace power in the United States, including the employment of air power in WWII, WWII, Korea, Vietnam, the Gulf War and the peaceful employment of U.S. air power in civic actions, scientific missions and support of space exploration.

AFSC 211 EVOLUTION OF UNITED STATES AIR AND SPACE POWER II 1
Continuation of AFSC210. Survey course focused on the beginnings of manned flight and the development of aerospace power in the United States, including the employment of air power in WWII, WWII, Korea, Vietnam, the Gulf War and the peaceful employment of U.S. air power in civic actions, scientific missions and support of space exploration.

AFSC 250 FIELD TRAINING PREPARATION I 0 PF
This course (to be taken in conjunction with AFSC 210 and AFSC 211 respectively) provides you with the opportunity to demonstrate fundamental management skills and prepares you for Field Training.
RESTRICTIONS: Open to sophomores and juniors. Required for all cadets planning to attend field training in the next year.
AFSC 251  
FIELD TRAINING PREPARATION II 0 PF  
This course (to be taken in conjunction with AFSC 210 and AFSC 211 respectively) provides you with the opportunity to demonstrate fundamental management skills and prepares you for Field Training.  
RESTRICTIONS: Open to sophomores and juniors. Required for all cadets planning to attend field training in the next year.

AFSC 310  
LEADERSHIP STUDIES I 3  
This course is a study in the anatomy of leadership, the need for quality and management leadership, the role of discipline in leadership situations and the variables affecting leadership. Case studies are used to examine Air Force leadership and management situations as a means of demonstrating and exercising practical application of the concepts. Deal with actual problems and complete projects associated with planning and managing the Leadership Laboratory.  
RESTRICTIONS: Students must complete Air Force Field Training the summer prior to enrolling in AFSC310. This training is an initial component of the coursework contained in the class.

AFSC 311  
LEADERSHIP STUDIES II 3  
Continuation of AFSC 310. This course is a study in the anatomy of leadership, the need for quality and management leadership, the role of discipline in leadership situations and the variables affecting leadership. Case studies are used to examine Air Force leadership and management situations as a means of demonstrating and exercising practical application of the concepts. Deal with actual problems and complete projects associated with planning and managing the Leadership Laboratory.

AFSC 350  
INTERMEDIATE CADET LEADER TRAINING I 0 PF  
This course (taken in conjunction with AFSC 310 and AFSC 311 respectively) provides you the opportunity to develop your fundamental management skills while planning and conducting cadet activities.  
COREQ: AFSC310. RESTRICTIONS: Restricted to those cadets who have completed Field Training.

AFSC 351  
INTERMEDIATE CADET LEADER TRAINING II 0 PF  
This course (taken in conjunction with AFSC 310 and AFSC 311 respectively) provides you the opportunity to develop your fundamental management skills while planning and conducting cadet activities.  
COREQ: AFSC311. RESTRICTIONS: Restricted to those cadets who have completed Field Training.

AFSC 410  
NATIONAL SECURITY AFFAIRS I 3  
Learn about the role of the professional military leader in a democratic society; societal attitudes toward the armed forces; the requisites for maintaining adequate national defense structure; the impact of technological and international developments on strategic preparedness and the overall policy-making process; and military law. In addition, you will study topics that will prepare you for your first active-duty assignment as an officer in the Air Force.

AFSC 411  
NATIONAL SECURITY AFFAIRS II 3  
Continuation of AFSC 410. Learn about the role of the professional military leader in a democratic society; societal attitudes toward the armed forces; the requisites for maintaining adequate national defense structure; the impact of technological and international developments on strategic preparedness and the overall policy-making process; and military law. In addition, you will study topics that will prepare you for your first active-duty assignment as an officer in the Air Force.

AFSC 450  
SENIOR CADET LEADER TRAINING I 0 PF  
This course (taken in conjunction with AFSC 410 and AFSC 411 respectively) provides you with the opportunity to use your leadership skills in planning and conducting cadet activities. It prepares you for commissioning and entry into the active-duty Air Force.  
COREQ: AFSC410. Restricted to those cadets who have completed Field Training.

AFSC 451  
SENIOR CADET LEADER TRAINING II 0 PF  
This course (taken in conjunction with AFSC 410 and AFSC 411 respectively) provides you with the opportunity to use your leadership skills in planning and conducting cadet activities. It prepares you for commissioning and entry into the active-duty Air Force.  
COREQ: AFSC411. RESTRICTIONS: Restricted to those cadets who have completed Field Training.

AGED 266  
SPECIAL PROBLEM 1-3  
AGED 280  
FFA AND SUPERVISED AGRICULTURAL EXPERIENCE 3  
Acquaints the student with the activities necessary for an agricultural education program, specifically the history and structure of a FFA chapter and the development of individualized supervised agricultural experiences for high school students.  
RESTRICTIONS: Freshman or sophomore classification or approval of instructor.

AGED 366  
INDEPENDENT STUDY 1-6  
AGED 380  
PROGRAM PLANNING / MANAGEMENT 3  
Acquaint students with the principles and practices in planning, developing, managing, marketing and evaluating an agricultural education program at the middle or high school level.

AGED 425  
AGRICULTURAL LEADERSHIP: TOOLS AND TECHNIQUES 3  
Topics include leadership theories, team work, facilitation, internet research, problem solving and facilitating team activities focused on agricultural industries and professions. Global leadership issues will be added as appropriate.

AGED 426  
GLOBAL LEADERSHIP PERSPECTIVES IN AGRICULTURE 3  
Designed to help people in agriculture organizational environments, today and in the future, learn leadership skills which are effective with individuals from different cultures and are based in several locations and time zones.

AGED 430  
WORKING WITH ADVISORY COUNCILS 3  
Organize, manage, and follow-up advisory council meetings. Skill development includes working with small groups, strategic planning, conflict management, and communication.

AGED 448  
STUDENT TEACHING SEMINAR 3  
Provides support to undergraduates during their student teaching experience. Covers various aspects of professional development, portfolio development, and classroom management.  
COREQ: EDUC400.

AGED 466  
INDEPENDENT STUDY 1-6  
AGED 480  
METHODS OF TEACHING AGRICULTURE AND TECHNOLOGY EDUCATION I 3  
Teaching methods, treatment of aims, materials, unit organization, evaluation and teaching techniques. Participation in career and technical student organization activities required.  
PREREQ: Students must show evidence of passing Praxis I. RESTRICTIONS: School practicum of 12 hours required.

AGED 481  
METHODS OF TEACHING AGRICULTURE AND TECHNOLOGY EDUCATION II 3  
Methods of teaching and organization in supervised career and technical programs, applied technical skills and adult education and community activities. Participation in career and technical student organization activities required.

AGED 600  
INTERNSHIP IN TEACHING 9  
Fourteen week teaching internship experience in 7th-12th grade schools under the guidance and supervision of a cooperating teacher in the classroom and a University of Delaware supervisor.  
PREREQ: Must show evidence of passing Praxis I.

AGED 625  
AGRICULTURAL LEADERSHIP: TOOLS AND TECHNIQUES 3  
Topics include leadership theories, team work, facilitation, internet research, problem solving and facilitating team activities focused on the agricultural industries and professions.

AGED 626  
GLOBAL LEADERSHIP PERSPECTIVES IN AGRICULTURE 3  
Designed to help people in agriculture organizational environments, today and in the future, learn leadership skills which are effective with individuals from different cultures and are based in several locations and time zones.

AGED 630  
WORKING WITH ADVISORY COUNCILS 3  
Organize, manage, and follow-up advisory council meetings. Skill development includes working with small groups, strategic planning, conflict management, and communication.

AGED 180  
INTRODUCTION TO AGRICULTURAL EDUCATION 3  
Provides the foundation for planning activities necessary for an agricultural education program. Historical foundations, purposes and roles of schools, contemporary issues and careers in agricultural education are discussed. An early field-based experience and portfolio development is included.  
RESTRICTIONS: Freshman or sophomore classification or approval of instructor.

Agricultural Education
AGED 648  **STUDENT TEACHING SEMINAR**  3
Provides support to graduates during their student teaching experience. Covers various aspects of professional development, portfolio development and classroom management.
PREREQ: Completion of at least 21 graduate credits toward master’s degree and evidence of passing Praxis II content area as specified by the State of Delaware.
COREQ: AGED600.

AGED 666  **SPECIAL PROBLEM**  1-12

AGED 680  **METHODS OF TEACHING AGRICULTURE AND TECHNICAL EDUCATION I**  3
Teaching methods, treatment of aims, materials, unit organization, evaluation and teaching techniques. Participation in career and technical student organization activities required.
PREREQ: Students must show evidence of passing Praxis I. RESTRICTIONS: School practicum of 12 hours required.

AGED 681  **METHODS OF TEACHING AGRICULTURE AND TECHNOLOGY EDUCATION II**  3
Methods of teaching and organization in supervised career and technical programs; applied technical skills and adult education and community activities. Participation in student career and technical activities required.

**AGRICULTURE**

AGRI 164  **PRACTICAL TEAMWORK EXPERIENCE**  1-3
Examines roles of leaders, strategies for working in teams, and principles of event planning. The final project is the planning and execution of Ag Day, a college-wide community event.
RESTRICTIONS: Limited to majors in the College of Agriculture and Natural Resources.

AGRI 165  **MASTERING THE FRESHMAN YEAR**  1 PF
Focuses on academic services, career exploration and preparation, campus resources, and practical skills that are helpful in mastering the freshman year.
RESTRICTIONS: Limited to freshmen in the College of Agriculture and Natural Resources.

AGRI 211  **LITERATURE OF THE AGRICULTURAL AND LIFE SCIENCES**  1
Promotes familiarity with arrangement of the card catalog, guides to literature, indexes to periodical literature, abstracting services, bibliographic form, and scientific papers and reports. Aids students in scientific writing and reporting.
RESTRICTIONS: Not open to freshmen.

AGRI 212  **ORAL COMMUNICATION IN AGRICULTURE AND NATURAL RESOURCES**  3
Introduces basic communication principles and provides a series of experiences designed to develop skills needed for oral presentations and other forms of public and interpersonal communication.
RESTRICTIONS: Open to majors only.

AGRI 224  **ONE HEALTH: ZOONOTIC AND EMERGING DISEASES**  3
Introduction to the concept of One Health, zoonotic and emerging diseases. The integration of human, animal and environmental health and the impact on infectious diseases. The use of antibiotics in animal production and human/animal medicine, and its emerging disease consequences.
PREREQ: BISC207 or BISC205 or ANFS240 or permission of instructor.

AGRI 399  **TEACHING ASSISTANT**  1-4 PF
Practical teaching experience. Students participate and assist in instruction of an undergraduate course.
PREREQ: Must have taken the course for which assisting, or have equivalent experience. RESTRICTIONS: An overall gpa of 2.5 or better is required. Maximum of 4 credits may count toward graduation.

**ANIMAL AND FOOD SCIENCES**

ANFS 100  **ANIMALS AND HUMAN CULTURE**  3
Animals have important roles in human society and their significance varies across diverse cultural settings. Explore human-animal interactions on issues related to food and fiber production, welfare, conservation, research, work and service, natural and man-made disasters, zoonotic disease, and human health.

ANFS 101  **ANIMALS, SCIENCE AND SOCIETY**  3
An introduction to the understanding of how domestic food animals function - genetics, nutrition, reproductive physiology, behavior and animal health. The course begins with a dialogue about the human-animal bond and the role of animals in society, and ends with the discussion of how agricultural animals are managed to produce safe and healthy food.
RESTRICTIONS: ANFS111 mandatory for majors, optional for nonmajors. Offered in Fall only.

ANFS 102  **FOOD FOR THOUGHT**  3
Overview of our foods today including how the composition, safety, processing, and chemistry influence our choices and overall production of food. The effects of social influences and marketing of foods will be discussed as these are important consideration for individuals and food companies.

ANFS 107  **SNACK SCIENCE**  4
An overview of topics from introductory biology, chemistry, and physics focusing on their applications to food and cooking. Emphasis will be placed on the use of the scientific method as a critical thinking tool through the use of laboratory experiments and problem based learning.
Crosslisted with SCEN107.

ANFS 111  **ANIMAL AND FOOD SCIENCE LABORATORY**  1
Laboratory providing the opportunity to handle animals and to become familiar with common management practices associated with the production of animals and food.
COREQ: ANFS101 RESTRICTIONS: Corequisite mandatory for majors, optional for nonmajors. Offered in Fall only.

ANFS 112  **ANIMAL HANDLING**  1
This course will provide students with a basic skill set pertaining to the handling of agricultural and laboratory animals. Each two-week module will consist of foundational learning in an active classroom environment followed by hands-on laboratory period.

ANFS 159  **TOPICS IN FOOD SCIENCE**  1
Introduction to the area of food science and technology. Topics include product development, current food controversies, fundamental issues in food processing, food safety and food manufacturing. Primarily taught using a problem-based learning format.

ANFS 165  **FRESHMAN FIRST YEAR EXPERIENCE**  1
Provides practical skills that foster academic and social competencies necessary for success in college. Focuses on academic services, campus resources, career exploration and preparation.
RESTRICTIONS: Limited to freshmen majors.

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

ANFS 181  **FROM THE COW TO THE CONE: THE SCIENCE AND BUSINESS OF ICE CREAM**  3
Explores the science and technology of flavorings, freezing, production and quality control of ice cream and other frozen desserts. Students learn what it takes to create, market and manage a competitive ice cream business from start to finish; study the latest ice cream trends; and develop products in the UDairy Creamery.
RESTRICTION: Typically offered in the four-week winter session.

ANFS 206  **FARM TO TABLE**  3
How does food get from the farm to your table? Explore traditional agriculture and contemporary food production models like Community Supported Agriculture (CSA), community gardens and the local food movement. Learn about new crops and dietary strategies that can be incorporated into the way people eat today.
Examine cultural influences on food production and consumption patterns, and biocultural aspects of nutrition. Students will complete several projects that include interviews, research, food shopping excursions, film critiques and menu planning. Students will volunteer at the Delaware Food Bank and/or Gardens for the Community.
Crosslisted with PLSC206.

ANFS 218  **FERMENTATION SCIENCES**  3
A basic, survey overview of fermented products. It covers a range of topics, including fermentation history, biochemistry behind fermentation, different fermentative organisms, and production of many popular items such as cheese, bread, beer and vegetables, among other items.
Crosslisted with PLSC218.

ANFS 220  **INTRODUCTION TO EQUINE SCIENCE**  3
An overview of equine science which focuses on the unique equine biology, function and husbandry of the horse.
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<td>ANFS 402</td>
<td>Forage Resource Management</td>
<td>3</td>
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<tr>
<td>ANFS 404</td>
<td>Dairy Production</td>
<td>4</td>
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<tr>
<td>ANFS 409</td>
<td>Food Processing</td>
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<tr>
<td>ANFS 411</td>
<td>Food Science Capstone</td>
<td>4</td>
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<tr>
<td>ANFS 415</td>
<td>Developmental Biology</td>
<td>3</td>
</tr>
</tbody>
</table>

**ANFS 230**
An introduction to basic epidemiology and a critical review of contemporary food- and water-borne outbreaks. Presents current issues in light of developments related to food safety and public health. Emphasis on emerging pathogens, virulence factors, epidemiological techniques, rapid detection methods, and quantitative risk assessment.

**ANFS 240**
Identification of relationship between form and function in domestic farm animals. Comparative examination of body systems in order to better understand the various management practices employed in animal agriculture. Serves as prerequisite for advanced management courses.

**ANFS 241**
Principles of nutrition applied to the feeding management of horses. Focus on the nutritional requirements of horses for growth, reproduction, and work. Discussion of the advantages and disadvantages of common feedstuffs or horses, formulating equine diets, meeting nutritional requirements in real-life situations.

**ANFS 245**
Comparative Physiology of Domestic Animals covers the physical, biological, and chemical functions of normal animal body systems at molecular, cellular, organ, system, and whole organism levels. To apply physiologic concepts, students are introduced to pathophysiology, disease processes that arise from alterations in the normal state.

**ANFS 261**
A broad overview of the principles of nutrition as they are applied to pets and companion animals.

**ANFS 265**
Emphasis on career discovery and development in the area of animal and food science. Preparation for professional schools including veterinary and graduate programs. Explore current and future trends in fields of animal science, food science and technology, research, teaching, and animal agriculture.

**ANFS 266**
REQUIRE: Contract must have department chair signature. Independent study to involve library or lab research.

**ANFS 270**
Introduction to agricultural biotechnology and socioeconomic issues. Introduces genetic engineering and the basic scientific theory and the applications of biotechnology in agriculture production and research. Presents issues surrounding biotechnology-risk and technology assessment, animal rights, public and private research interface, media and environmental perspectives, consumer acceptance, regulation and economic development. May be crosslisted with APEC270, PLSC270.

**ANFS 300**
Introduction to the theory and application of genetics as related to the improvement of plants and animals. May be crosslisted with ENVC300, PLSC300. PREREQ: PLSC101 or BISC207 or BISC208.

**ANFS 305**
Compositional, structural, and functional properties of food and the fundamentals of commercial food processing. Discussion and video demonstrations of various food processing and preservation methods and the effects of ingredient manipulation.

**ANFS 310**
Laboratory exercises concerning genetic concepts, methods and applications using various plant and animal systems. May be crosslisted with ENVC310, PLSC310. COREQ: ANFS300.

**ANFS 315**
Examination of safety issues in major food production systems in plants and animals (dairy, beef, swine, poultry, seafood). Study of government regulation, the use of antimicrobials and pesticide residues. Explores the consumer's perception of biotechnology, organic farming, and post-harvest handling of agricultural commodities. PREREQ: BISC207 or equivalent. RESTRICTIONS: Offered in Spring semester.

**ANFS 324**
A study of infectious and non-infectious diseases common to the horse. Principles of pathophysiology, manifestation, prevention, and control of disease will be emphasized. Approximately one third of course content will include types, cause, prevention, and management of musculoskeletal disease (lameness) in the horse.

**ANFS 332**
Develop an appreciation for the nature and mechanisms of disease conditions and processes in agricultural and domestic animal species through an understanding of basic immunology, microbiology and virology.

**ANFS 340**
Modern technologies highlight the inextricable links between the animals and their environments, making environmental management more important. Discuss the principles of animal environment management related to companion, farm, and research animals. Laboratories are designed to reinforce course content by development of hands-on skills.

**ANFS 350**
Introduction to domestic and companion animal behavior, in relation to animal management, production, and welfare. Lectures cover animal behavior and its basis, including genetic, physiological and environmental factors, as well as different types of behavior, including communication, feeding, social, parental, and others.

**ANFS 359**
Three years teaching experience. Students participate and assist in instruction of an undergraduate course.

**ANFS 402**
Exploration of the various grasses, legumes, and forbs that have a potential as forage crops. Discussions will cover characteristics of each species that make it suited for a particular type of forage use. Cultural practices for successful plantings, maintenance, harvest and storage will be covered.

**ANFS 404**
A study of nutrition, reproduction, physiology, health, and management as they relate to modern dairy production.

**ANFS 409**
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.

**ANFS 411**
A capstone course for seniors to complete food science learning experience by participating in a product development team that simulates the real-world operation and requires integrated knowledge in areas of general food science, food chemistry, food analysis, food microbiology and food processing.

**ANFS 415**
Explore mechanisms underlying development. Topics: gamete interactions, establishment of body plans, cell signaling and tissue interactions, morphogenetic pattern formation, developmental regulation of gene expression, molecular control of tissue specification and diversification, and the evolutionary comparison of developmental processes. Diseases resulting from developmental defects will be discussed.

**ANFS 415**
Crosslisted with BISC415. PREREQ: BISC207 and BISC208.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANFS 417</td>
<td>BEEF CATTLE AND SHEEP PRODUCTION</td>
<td>4</td>
<td>Principles of modern beef cattle and sheep production; nutrition, reproduction, housing, health and management. PREREQ: ANFS101 and ANFS251. RESTRICTIONS: Laboratory requires some out-of-class time for hands-on experience in animal production.</td>
</tr>
<tr>
<td>ANFS 418</td>
<td>SWINE PRODUCTION</td>
<td>4</td>
<td>Principles of modern swine production: nutrition, reproduction, housing, health and management. PREREQ: ANFS101 and ANFS251. RESTRICTIONS: Laboratory requires some out-of-class time for hands-on experience in animal production.</td>
</tr>
<tr>
<td>ANFS 419</td>
<td>TOPICS IN INTERNATIONAL ANIMAL AGRICULTURE</td>
<td>3-4</td>
<td>Instruction in animal production taught as part of a study abroad course. Topics vary with program location and focus. PREREQ: ANFS101.</td>
</tr>
<tr>
<td>ANFS 420</td>
<td>EQUINE REPRODUCTIVE MANAGEMENT</td>
<td>4</td>
<td>Provides in-depth study of the anatomy, endocrinology, physiology, behavior, and management of the mare, stallion, and foal. Laboratory provides opportunity to care for a pregnant mare, to be present at foaling, and care for newborn foal. PREREQ: ANFS101 and ANFS220 or permission of instructor.</td>
</tr>
<tr>
<td>ANFS 421</td>
<td>POULTRY PRODUCTION</td>
<td>3</td>
<td>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. PREREQ: ANFS101 and ANFS140 or permission of instructor. RESTRICTIONS: In order to obtain DLE credit student must also successfully complete ANFS422 (Poultry lab, 1 credit). Requires additional hands-on experience outside of class.</td>
</tr>
<tr>
<td>ANFS 422</td>
<td>POULTRY PRODUCTION LABORATORY</td>
<td>1</td>
<td>Fundamental principles of incubation, feeding, brooding, growing, disease control, processing and marketing as applied to broilers, heavy breeders and commercial egg producers. Requires additional hands-on experience outside of class. PREREQ: ANFS101 and ANFS140 or permission of instructor. RESTRICTIONS: In order to obtain DLE credit student must also successfully complete ANFS421 (Poultry Production, 3 credit).</td>
</tr>
<tr>
<td>ANFS 424</td>
<td>NONRUMINANT NUTRITION</td>
<td>3</td>
<td>Advanced comparative study of digestion, absorption and metabolism of nutrients in terms of the needs of nonruminant animals. Application of principles to swine, poultry and equine nutrition. PREREQ: ANFS251, CHEM214. RESTRICTIONS: Offered in Spring of odd-numbered years.</td>
</tr>
<tr>
<td>ANFS 426</td>
<td>EQUINE MANAGEMENT</td>
<td>4</td>
<td>Application of scientific principles of nutrition, health care, behavior, reproduction, and farm management to the discipline of horse management. Laboratory provides hands-on experience. Intended for students interested in the horse industry. ANFS 220 or previous equine experience is recommended. Laboratory may require some out-of-class time for hands-on experience.</td>
</tr>
<tr>
<td>ANFS 428</td>
<td>FOOD CHEMISTRY</td>
<td>4</td>
<td>Composition of food materials, reaction mechanisms leading to deterioration; and interaction of food components to form desirable and undesirable products, pigments, characterization of food polymers. Effect of physical and chemical factors on the structure and functionality of food. PREREQ: CHEM214 or CHEMS27.</td>
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<tr>
<td>ANFS 429</td>
<td>FOOD ANALYSIS</td>
<td>4</td>
<td>Theory and practice of food analysis. Determine the chemical composition and characteristics of food. Introduction to instrumentation; spectroscopy, chromatography, electrophoresis, enzyme analysis and titration. Critically examine food analytical methods and data from journal articles including official AOAC and AAC methods and prepare scientific reports and presentations including a scientific poster. PREREQ: CHEM214 or CHEMS27, and CHEMM220.</td>
</tr>
<tr>
<td>ANFS 432</td>
<td>DISEASE PATHOGENESIS IN ANIMALS</td>
<td>3</td>
<td>An introduction to host (immunological/physiological/genetic) and environmental (microbes/toxins/nutrition/temperature/other) factors which contribute to disease pathogenesis in animals. Encompasses microbial infections, allergic responses, autoimmune, malignancy, organ-specific syndromes, the stress response, and aging. PREREQ: BISC205 or BISC208 or ANFS332.</td>
</tr>
<tr>
<td>ANFS 435</td>
<td>ANIMAL VIROLOGY</td>
<td>3</td>
<td>Lecture-based introduction to virus functional characterization; including, classification methods, replication strategies and pathogen-host interactions. Content stresses current methods in diagnosis and analysis of viruses associated with important animal diseases. PREREQ: BISC300.</td>
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<tr>
<td>ANFS 436</td>
<td>IMMUNOLOGY OF DOMESTIC ANIMALS</td>
<td>3</td>
<td>Comparative study of the immune response of domestic animals including dog, cat, horse, pig, chicken and others. General topics include ontology of the immune system, reproductive immunity, neonatal immunity, immunodeficiencies and autoimmunity. PREREQ: ANFS332 and BISC207 and BISC205. RESTRICTIONS: Offered in Fall of even-numbered years.</td>
</tr>
<tr>
<td>ANFS 439</td>
<td>FOOD MICROBIOLOGY</td>
<td>4</td>
<td>The role and significance of microorganisms in foods with particular reference to food spoilage, preservation, fermentation, sanitation and poisoning. Current methodology used in the microbiological examination of foodstuffs. PREREQ: BISC300.</td>
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<tr>
<td>ANFS 440</td>
<td>COMPARATIVE HISTOPATHOLOGY</td>
<td>4</td>
<td>Comparative Histopathology explores the light and electron microscopic structure of normal and diseased cells, tissues, and organ systems. Lectures will emphasize normal tissue and organ architecture, while correlating structure to function in health and disease. Associated laboratories will focus on tissue and lesion identification with an introduction to fundamental pathologic processes encountered in living tissues. PREREQ: BISC208 or BISC205, or permission of instructor. RESTRICTIONS: ANFS140 or equivalent anatomy course is highly recommended.</td>
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<tr>
<td>ANFS 441</td>
<td>REPRODUCTIVE PHYSIOLOGY OF DOMESTIC ANIMALS</td>
<td>3</td>
<td>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: ANFS140. BISC306 strongly recommended.</td>
</tr>
<tr>
<td>ANFS 442</td>
<td>LACTATIONAL PHYSIOLOGY</td>
<td>3</td>
<td>Physiology and metabolism of lactation are evaluated at the cellular, tissue, organ, and whole animal levels. Emphasis areas include nutrient biochemistry, endocrinology, the nervous system, and mammary gland structural response to stage of reproduction. Examples primarily come from commercial dairy species, rodents, and humans. PREREQ: ANFS140.</td>
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<tr>
<td>ANFS 443</td>
<td>FOOD ENGINEERING TECHNOLOGY</td>
<td>4</td>
<td>Engineering fundamentals for processing of food materials, including applied thermodynamics and heat transfer principles and operations. May be crosslisted with BREG445. PREREQ: PHYS201. RESTRICTIONS: Not open to majors in mechanical or chemical engineering.</td>
</tr>
<tr>
<td>ANFS 445</td>
<td>COMPARATIVE PHYSIOLOGY OF DOMESTIC ANIMALS</td>
<td>3</td>
<td>Provides with an in-depth knowledge of the physical, biological and chemical principles that underlie life processes at all levels of organization: molecular, cellular, organ, system and the whole organism. PREREQ: ANFS140, CHEMS27 or CHEM214. COREQ: PHYS201 or PHYS202. RESTRICTIONS: Required for PVBAB major. Successful completion of this course will prepare students for professional careers in animal agriculture or for more advanced courses in physiology, cell biology, endocrinology and systems biology offered in veterinary, medical a</td>
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<tr>
<td>ANFS 449</td>
<td>FOOD BIOTECHNOLOGY</td>
<td>4</td>
<td>Traditional food biotechnology and biotechnology based on genetic engineering are explored through in-depth study of current examples. Technical, economic and social aspects of biotechnology are researched and analyzed through individual and group assignments and lectures. Field trips provide a view of local biotechnology enterprises.</td>
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<tr>
<td>ANFS 450</td>
<td>APPLIED BIOMEDICAL COMMUNICATION</td>
<td>3</td>
<td>Applied Biomedical Communication explores methodology, technique, and ethical issues fundamental to written, oral, and visual communications in the biological and medical sciences through lecture, active learning experiences and an immersive course project. Class sessions will focus on scientific method and reasoning, hypothesis development and testing, source documentation and citation, format and types of biomedical communications, the peer review process, and related ethical issues. PREREQ: ENGL110. RESTRICTIONS: Must have greater than 60 credits to have this course fulfill second writing requirement.</td>
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<tr>
<td>ANFS 451</td>
<td>EMERGENCY ANIMAL MANAGEMENT</td>
<td>3</td>
<td>Diseases, weather, and human centered activity can cause tremendous disruption to companion animals and animal agriculture. All animals are at risk during a disaster. Emergency response often utilizes a framework that includes surveillance, quarantine, treatment, disposal, and disinfection. Course will discuss livestock, companion animal, and specialty animals.</td>
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</table>
ANFS 454 Ruminant Nutrition 3
Practical and applied aspects of ruminant nutrition with an emphasis on dairy. Topics include basic nutrient requirements and nutrition management aspects for different age and production classes of dairy cattle. PREREQ: ANFS5251, CHEM214 or CHEMS27 or CHEMS64.

ANFS 455 The Gut Microbiome: Microbial and Host Perspectives 4
The gut microbiome is a major component of animal and human health. Explore the microbiome, its physiological and disease roles, methods of study, host-microbiome interactions, and microbiome interventions in health and disease. PREREQ: BISC300 or permission of instructor.

ANFS 464 Animal and Food Science Experience 1-3 PF
Opportunity to gain work experience in a field related to the animal or food sciences and to explore potential occupational areas. A minimum of 40 hours of technical activities is required per credit hour. May be repeated twice for 6 credits. RESTRICTIONS: Signed contract and permission of the department chairperson.

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

ANFS 468 Research 1-3
Supervised, faculty-monitored, experience in research in the fields of animal science or food science. Students must keep a log of activities, submit regular reports and submit a final report. RESTRICTIONS: Requires contract form to be completed and approved by department chairperson or designate prior to registering. One credit requires a minimum of 40 hours of research.

ANFS 470 Principles of Molecular Genetics 3
Fundamentals of nucleic acid biochemistry (replication, repair and recombination) and bacterial genetics are studied to provide the background needed for detailed study of selected topics in animal and plant molecular biology. PREREQ: ANFS300 or permission of instructor.

ANFS 512 Connections in Food Science 2 PF
Investigate modern food culture through seminars, lectures, and problem-based learning: exploring topics critical to feeding the world including: food production methods, flavor trends, product development, and contemporary issues of safety, security and quality.

ANFS 602 Forage Resource Management 3
Exploration of the various grasses, legumes, and forbs that have potential as forage crops. Discussions will cover characteristics of each species that make it suited for a particular type of forage use. Cultural practices for successful plantings, maintenance, harvest and storage and preservation will be covered. Crosslisted with PLSC641.

ANFS 609 Food Processing 4
Rationale and history of food processing; organizing unit operations; maintenance of food quality including food palatability and nutritional value; separation technology including initial operations, size reduction and screening, mixing, filtration, centrifugation and crystallization; and preservation methods including fresh food storage, low temperature and high temperature methods.

ANFS 611 Food Science Capstone 4
Capstone course for graduate students to advance food science training by participating in a food product development team that simulates real-world operation and requires integrated knowledge in areas of general food science, food chemistry, food analysis, food microbiology and food processing.

ANFS 615 Developmental Biology 3
Explore mechanisms underlying development. Topics: gamete interactions, establishment of body plans, cell signaling and tissue interactions, morphogenetic pattern formation, developmental regulation of gene expression, molecular control of tissue specification and diversification, and the evolutionary comparison of developmental processes. Diseases resulting from developmental defects will be discussed. Crosslisted with BISC615. PREREQ: BISC401 and BISC403. RESTRICTIONS: Requires instructor approval.

ANFS 628 Food Chemistry 4
Composition of food materials, reaction mechanisms leading to deterioration; interaction of food components to form desirable and undesirable products, pigments, characterization of food polymers. Effect of physical and chemical factors on the structure and functionality of food.

ANFS 629 Food Analysis 4
Theory and practice of food analysis. Determine the chemical composition and characteristics of food. Introduction to spectroscopy, chromatography, electrophoresis, enzyme analysis and titration. Examine food analytical methods and data from journal articles including official AOAC and AACCM methods. Prepare scientific reports and presentations including a scientific poster.

ANFS 633 Poultry Pathology 3
Study of poultry diseases with emphasis on their causes, prevention, treatment and control. PREREQ: ANFS332, ANFS431 and ANFS635.

ANFS 635 Animal Virology 3
Introduction to virus functional characterization; including classification methods, replication strategies and pathogen-host interactions. Stresses current methods in the diagnosis and analysis of viruses associated with important animal diseases. PREREQ: BISC300.

ANFS 636 Immunology of Domestic Animals 3
Comparative study of the immune response of domestic animals including dog, cat, horse, pig, chicken and others. General topics include stoteny of the immune system, reproductive immunity, neonatal immunity, immunodeficiencies and autoimmunity. PREREQ: ANFS332 and BISC207. RESTRICTIONS: Offered in Fall of even-numbered years.

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

ANFS 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. PREREQ: BISC300.

ANFS 640 Comparative Histopathology 4
Comparative Histopathology explores the light and electron microscopic structure of normal and diseased cells, tissues, and organ systems. Lectures will emphasize normal tissue and organ architecture, while correlating structure to function in health and disease. Associated laboratories will focus on tissue and lesion identification with an introduction to fundamental pathologic processes encountered in living tissues. PREREQ: BISC 208 or by permission of instructor. RESTRICTIONS: ANFS 140 (Functional Anatomy) or equivalent course is highly recommended.

ANFS 642 Lactational Physiology 3
Fundamentals of physiology and lactation involved in initiation, maintenance and cessation of lactation. Neuroendocrine control of lactation, nutrient absorption and processing by mammary gland and control of milk composition. Covers mammals of commercial dairy importance as well as rodents, horses and humans. PREREQ: ANFS 140 or permission of instructor.

ANFS 643 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.

ANFS 644 Bioinformatics 3
Examines computer applications to biological sciences with emphasis placed upon genomics and proteomics applications. No computer programming experience required.

ANFS 649 Food Biotechnology 4
Traditional food biotechnology and biotechnology based on genetic engineering are explored through in-depth study of current examples. Technical, economic and social aspects of biotechnology are researched and analyzed through individual and group assignments and lectures. Field trips provide a view of local biotechnology enterprises.

ANFS 650 Applied Biomedical Communication 3
Applied Biomedical Communication explores methodology, technique, and ethical issues fundamental to written, oral, and visual communications in the biological and medical sciences through lecture, active learning experiences and an immersive course project. Class sessions will focus on scientific method and reasoning, hypothesis development and testing, source documentation and citation, format and types of biomedical communications, the peer review process, and related ethical issues. PREREQ: ENGL110.
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ANTH 104  INTRODUCTION TO ARCHAEOLOGY AND BIOLOGICAL ANTHROPOLOGY
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: Neither anthropology major nor degree credit for ANTH102 or ANTH103 will be granted if ANTH104 is taken.

ANTH 105  ARCHAEOLOGY OF MODERN WORLD
Introduces principal ideas, approaches, and research methods in historical archaeology. Presented through a comparative case study of the emergence of the modern world.

ANTH 106  INTRODUCTION TO ANTHROPOLOGY OF HEALTH
Introduces biocultural anthropological approaches to health. It covers topics ranging from evolutionary perspectives on health, ethnomedical systems, disease vs. illness, alternative medicine, placebo and nocebo, diet and nutrition, growth and development, reproductive health, aging, infections and chronic disease, stress, mental health, social determinants and health disparities. May be crosslisted with BHAN106.

ANTH 200  INTRODUCTION TO THE HISTORY OF ANTHROPOLOGICAL THEORY
Provides a foundation in anthropological theory and insights into the relationship between theory, method and social context. Examines the history of anthropology as an academic discipline and intellectual enterprise.

ANTH 201  VISUALIZING HUMANITY: ETHNOGRAPHIC FILM
Examines visual cultural representations, meanings and interpretations in the medium of ethnographic film. Introduces ethnographic filmmaking history and critical theory. Primarily encompasses regional subjects and cultural practices including those developed in Austronesia, Africa, North and South America, and South Asia.

ANTH 202  GENES, BONES AND HUMAN EVOLUTION
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. May be crosslisted with CGSC202.

ANTH 205  ANTHROPOLOGY AND HUMAN NATURE
Archaeological, biological and cultural anthropology organized around the themes of human nature. May be crosslisted with CGSC205.

ANTH 206  FARM TO TABLE
How does food get from the farm to your table? Explore traditional agriculture and contemporary farm food production models like Community Supported Agriculture (CSA), community gardens and the local food movement. Learn about new crops and dietary strategies that can be incorporated into the way people eat today. Examine cultural influences on food production and consumption patterns, and biocultural aspects of nutrition. Students will complete several projects that include interviews, research, food shopping excursions, film critiques and menu planning. Students will volunteer at the Delaware Food Bank and/or Gardens for the Community. Crosslisted with PLSC206.

ANTH 210  PEOPLES AND CULTURES OF SOUTHEAST ASIA
Introduction to diverse cultural, societal and ecological systems of Indonesia, Malaysia, Thailand, Vietnam, Singapore and the Philippines. Focuses on theoretical and ethnographic issues in culture, history and contemporary life of modern Southeast Asia.

ANTH 211  PEOPLES AND CULTURES OF EAST ASIA
Introduction to diverse cultural, societal and ecological systems of China, Japan, Korea and Taiwan as well as Overseas Chinese. Focuses on theoretical and ethnographic issues in culture, history and contemporary life of modern East Asia.

ANTH 212  THE ANTHROPOLOGY OF ISLAM
Focusing on cultural and social dimensions of the Islamic experience, uses anthropological case studies and theory to survey the Muslim world and to understand ways in which Islam is practiced, experienced and represented in Muslim societies from the Middle East, sub-Saharan Africa, South and Southeast Asia and the West. Examines interaction between the shared Islamic identity and distinctive local expressions of Islamic faith and life. Investigates ways in which Western scholars have interpreted Islamic societies and cultures.
ANTH 216  INTRODUCTION TO MATERIAL CULTURE STUDIES  3
Introduces students to material culture studies, broadly defined as study of all things people make and all the ways people have altered the physical world. Explores the approaches, concepts, and methods of various disciplines that investigate material culture. May be crosslisted with HIST216, MCST216.

ANTH 218  SOLVING ARCHAEOLOGICAL MYSTERIES  3
A consideration of how archaeologists use the scientific method to answer questions about ancient societies. Case studies introduce the research questions, theories, and methods that guide the collection, analysis, and interpretation of prehistoric remains. Students also experience doing hands-on research.

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 223  FOOD, GENDER AND CULTURE  3
Explores how preparing, eating, and thinking about food demonstrates culturally determined gender and power relations in different societies. Using cross-cultural and interdisciplinary perspectives, explores various understandings of issues such as nutrition, eating disorders, body images, and gender differences around food. May be crosslisted with WOMS223.

ANTH 225  PEASANT SOCIETIES  3
Comparative study of peasant communities in European, Asian, African and Latin American societies, including case studies of family life, religion and forms of social control and relationships to the ruling classes.

ANTH 227  AMERICAN CULTURE  3
Concepts and methods of cultural anthropology in contemporary America. The culture concept, American social structure, language, values and beliefs.

ANTH 228  PEOPLES AND CULTURES OF THE SOUTHWEST  3
Cultures, institutions and ethnic groups of southwestern United States. Analysis of both prehistoric and historic cultures, continuity and change.

ANTH 229  INDIANS OF NORTH AMERICA  3
An introductory comparative study of Native American cultures as they existed prior to their disruption by European contact. Uses the culture area approach.

ANTH 230  PEOPLES OF THE WORLD  3
Anthropological studies of societies and culture areas throughout the world to illustrate their characteristics and anthropological issues.

ANTH 232  THE ANTHROPOLOGY OF GLOBAL YOUTH  3
Joins American and International students in a mutual learning about cultural differences and similarities as young, privileged, and connected citizens of today’s globalized world. Structured to engage students in shared, face-to-face cultural explorations in which they teach each other about their culture and their lives. The goal is to generate and establish deeper cross-cultural understanding and to build confident interactions between them.

ANTH 235  ANTHROPOLOGY OF FOOD  3
Explores relationship between food and culture in the past and in the contemporary world. Topics include the economic, political and symbolic dimensions of food, effects of dietary changes on health, role of globalization, and causes of hunger and famine.

ANTH 236  ANTHROPOLOGY OF SPORT  3
Examines sports from a cross-cultural perspective. The unifying theme is how sports interact with and reflect other aspects of culture, such as economics, politics, religion, identity, gender, and change. These inter-relationships are examined in case studies drawn from traditional and contemporary cultures.

ANTH 239  ARTS AND CRAFTS OF NATIVE NORTH AMERICA  3
Anthropological analysis of indigenous technologies, arts, and crafts of native peoples of North America, including textiles, stoneworking, and ceramics.

ANTH 245  CONTEMPORARY NATIVE AMERICAN CULTURE ISSUES  3
An overview of cultural identity issues for Native Americans in the contemporary United States, including how Native Americans view their own cultures and society, perspectives they bring to the Euro-American and native encounters and to persistent denials of their distinctiveness in modern American society.

ANTH 251  INTRODUCTION TO ETHNIC ARTS  3
General survey of the ethnoarts from Africa, the Americas and the Pacific, including sculpture, painting, decoration and their interrelationships with oral literature, music, dance, games and ritual.

ANTH 255  APPLIED ANTHROPOLOGY  3
Anthropology applied to practical problems, including community development, directed change, agrarian reform and urban dislocation, particularly in Third World countries.

ANTH 265  HIGH CIVILIZATIONS OF THE AMERICAS  3
The origin and development of pre-Columbian civilizations in the Gulf Coast lowlands, Central Mexico, Yucatan peninsula and Andean area.

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

ANTH 270  ANTHROPOLOGY COLLOQUIUM  1 PF
Talks by individuals trained in anthropology who work in many different contexts: academic, government, business, museum, etc. Shows the full range of what people trained in anthropology do and how anthropology shaped and informed their view of the world and of their work.

ANTH 275  DELAWARE PREHISTORIC ARCHAEOLOGY  3
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 300  PRIMATOLOGY  3
Survey of the nonhuman primates, including their taxonomy and biological characteristics, and the study of their behavior and how it relates to human behavior.

ANTH 302  MEDICAL ANTHROPOLOGY  3
This course introduces the field of Medical Anthropology. It examines the interaction of biology and culture as it affects health and medical systems and focuses on: 1) cross cultural comparisons; 2) notion of adaptation in biocultural evolution; 3) understanding and appreciation of “exotic” ethnomedical systems; 4) critical cultural analysis of Biomedicine; 5) understanding of stigma, disability and the social process of health and illness; and 6) application of the concept of culture to practical problems in health delivery in a multicultural society. May be crosslisted with BHAN302.

ANTH 304  CULTURE, HEALTH & ENVIRONMENT  3
Human health and environmental health are intimately connected. Human behavior influences the health of the environment, which in turn influences human health. This course provides a biocultural perspective on culture, health, and environment, and their interactions. We will cover relationships between: 1) health and biodiversity, climate change, water, toxics, and energy; and 2) relationships between health and food, agriculture and dietary environment. May be crosslisted with BHAN304.

ANTH 305  THE EVOLUTION OF HUMAN SEX ROLES AND REPRODUCTION  3
Survey of the evolution of human reproduction and sex differences. Evidence derived from the human fossil record, living non-human primates, modern biological differences between human males and females and cross-cultural comparisons of reproductive behavior and sex roles. May be crosslisted with WOMS305.

ANTH 306  HUMAN VARIATION AND ADAPTATION  3
Concerned with the nature of human biological variation in modern populations around the world including the evolutionary forces that shape us both physically and physiologically and the interaction of that biology with our adaptation as a cultural species.
ANTH 307 NUTRITIONAL ANTHROPOLOGY 3
Nutritional Anthropology takes an explicit biocultural approach to nutrition, examining the interaction of biology and culture as they affect food systems, customs, practices and nutrition. Specific foci of the course include: evolutionary and comparative perspectives (biological baseline, agriculture, contemporary food systems); why we eat what we eat (materialist, symbolic explanations for foodways); adaptation of food to people and people to food; foods as medicines; under- and over-nutrition in contemporary world; child and infant feeding; hunger; solutions to diet-related problems.
May be crosslisted with BHAM307.

ANTH 310 WIVES, MISTRESSES, AND MATRIARCHS: ASIAN WOMEN’S LIVES 3
Using examples from China, Japan, Southeast Asia, South Asia, and the Middle East, examines how lives of Asian women have been constructed by cultural, historical, and international forces and seeks to understand and challenge culturally pervasive stereotypes that define their lives.
May be crosslisted with WOMS310.

ANTH 311 ANTHROPOLOGY OF TOURISM AND TRAVEL 3
Views tourism as an international industry, a cultural practice and a phenomenon of globalization. Examines such topics as tourism and modernity, sexual and romantic tourism, ecotourism and environmental tourism, tourism and “authenticity”.
May be crosslisted with WOMS315.

ANTH 312 ASIAN WOMEN IN THE GLOBALIZED WORKPLACE 3
Focuses on relationship between work, gender, and social, cultural, and economic transformations associated with globalization in East and Southeast Asia.
May be crosslisted with WOMS312.

ANTH 316 ISLAM AND GENDER 3
Uses anthropological case studies and historical material to comprehend ideals, practices, and themes of gender and gender relations in Islam. Introduces representations of Islamic belief in doctrinal, historical, and contemporary contexts.
May be crosslisted with WOMS316.

ANTH 318 TRIBAL LIFEWAYS 3
Examines the nature of tribal societies as they exist and have existed in the past, communities of a few hundred to a few thousand people linked by kinship, language and culture in a flexible political structure different from stereotype of tribal chiefs and warriors. Topics include evolutionary theories and archeological record of tribal development, institutional characteristics of tribal cultures, variability among tribal peoples, and contemporary views of concept of "tribe".

ANTH 320 PREHISTORY OF NORTH AMERICA 3
Major cultural and social developments of prehistoric humans in North America, from the entrance of the Paleoindians to the arrival of the Europeans in the 16th century.

ANTH 321 PREHISTORIC HUMAN ECOLOGY 3
Uses archaeological evidence to examine human-environmental interactions during the prehistoric period. It considers how past peoples adapted to their environments with two subsistence strategies, hunting/gathering and farming. Addresses two topics that are relevant to our own time, the impacts that ancient societies had on their environments and how they were affected by climate change.

ANTH 323 PREHISTORY OF SOUTH AMERICA 3
Survey of archaeological complexes and chronology, including lower Central America from western Costa Rica to Panama, and South America from the tropical forests to the Andean highlands. Major topics include the domestication of plants and animals and the rise of civilization.

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

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

ANTH 326 THE AFRICAN DIASPORA AND THE WORLD 3
Focus on the historical, geographical, and cultural specificities of cultures in the African diaspora. Addresses the following main topics: history and geography of the African diaspora; slavery and responses to slavery (rebellions and revolts); the ‘big thinkers’ of the African Diaspora, cultural manifestations (music and religion); discourses of whiteness, and ways to remember the Motherland.
May be crosslisted with BAMS326.

ANTH 328 MAYAN ART AND ARCHITECTURE 3
Introduction to the civilization of the Maya as evident in the Yucatan Peninsula. Incorporates visits to relevant archeological zones. Examines the geographical framework that shaped the development of Mayan culture, political and economic organizations, art, architecture, ideology and history.
Crosslisted with ARTH338. RESTRICTIONS: Offered abroad only.

ANTH 329 THE ARCHAEOLOGY OF AGRICULTURE 3
Survey of the worldwide transitions from hunting and gathering adaptations to agricultural lifeways. Examines archaeological evidence of these transitions and theories of their causes and consequences using broad anthropological and interdisciplinary perspectives.

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

ANTH 333 PEOPLES OF AFRICA 3
Social institutions and cultural traditions of Africa; political, economic, legal and kinship systems, and modes of thought.
May be crosslisted with BAMS333.

ANTH 334 PEOPLES AND CULTURES OF ARGENTINA 3
The origins and formation of the cultural, social, economic and political characteristics of Argentina. The historical construction of an Argentinian national identity provides students with an opportunity to understand one example of the sources and forces of historical change in ideas, beliefs, institutions, and cultures.

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

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

ANTH 341 ISSUES, METHODS ARCHAEOLOGICAL RSRCH 3
This course provides students with hands-on training in the fundamentals of archaeological research and its conduct in the real world. Topics covered focus on methods used to organize the collection and study of various kinds of archaeological data as they pertain to the research questions archaeologists hope to answer. Specific topics include: archaeological research design, quantitative analysis and issues in archaeological sampling, analysis of lithic and ceramic artifacts, paleoenvironmental reconstructions and geoarchaeology, the development and testing of quantitative predictive models, and the application of these methods in cultural resource management.

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

ANTH 344 ANTHROPOLOGY OF CLOTHES 3
Study of clothes in cross-cultural perspective. Uses anthropological perspective to examine varying standards of beauty worldwide and impact and reflection of clothes on other aspects of culture (e.g., economics, politics, gender, religion). Causes and consequences of changing styles of dress through the topic of globalization.
**ANTH 350** [Contemporary Topics in Anthropology](#) 3
Examines contemporary challenges and debates from anthropological perspectives and applying anthropological ways of thinking. Focus on current world problems: topics include migration and refugees; environmental sustainability and food security; climate change; war, imperialism, and ethnic violence; religious strife; nationalism, transnationalism, and postnationalism; economic and social inequity; race and racism; and gender identities and relations. Students will explore these problems and debates using diverse methods.

**ANTH 351** [Race and Ethnicity in Latin America](#) 3
Explores the multiple, complex and historically changing meanings of race and ethnicity in Latin America, and the consequences of discrimination towards specific groups. Regions covered are the Caribbean, Mexico and Central America, and the Andean, Atlantic and Southern Cone regions of South America. May be crosslisted with BAMS351.

**ANTH 356** [Anthropology of Childhood](#) 3
Many aspects of childhood that seem inevitable or natural are, in fact, shaped by culture and not rooted in our biology. Examine childhood from biological and cultural perspectives, examining how humans compare to nonhuman primates and how humans vary today and through time.

**ANTH 360** [American Anabaptists: Amish, Mennonite and Brethren Cultures](#) 3
Examines the origins, development, and current status of Amish, Mennonite and Brethren communities in the United States. Special emphasis placed on the varied methods these groups have used to establish and maintain a visible and distinctive identity separate from mainstream American culture. The merchandizing and consumption of their separate identity through tourism is also discussed.

**ANTH 363** [Women in Cross-Cultural Perspective](#) 3
Social realities of women within the cultures of Asia, Africa and Latin American societies. How institutions such as motherhood, the family, sexuality and work structure women’s lives within the dominant social ideologies. Crosslisted with WOMS363.

**ANTH 366** [Independent Study](#) 1-6

**ANTH 370** [Culture of Food Production and Economic Development](#) 3
Social and cultural dynamics of food production, distribution and consumption throughout the developing world, examined in the context of concepts and policies of development.

**ANTH 372** [Culture and Colonialism](#) 3
This course examines the cultural and historical contexts of European colonialism in Africa, Asia, and the Americas from an anthropological perspective. It compares the relationships between the colonized and the colonizers during the 19th and early 20th centuries and uses ethnographic, historical, and literary texts.

**ANTH 375** [Peoples and Cultures of Modern Latin America](#) 3
Contemporary cultures and societies of Latin America, with emphasis on historical perspective. Rural and urban populations, the elite, the military, the church, students and workers. May be crosslisted with BAMS375.

**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 crosslisted with HIST379.

**ANTH 381** [Visions of Native Americans](#) 3
Critically examines the visual images of Native Americans that have been created in films, photography, commercial art and media and analyzes how those images function in Euroamerican culture.

**ANTH 382** [The Anthropology of Capitalism](#) 3
How culture affects business and capitalism in societies worldwide and how modern capitalist life affects culture. Looks at diverse work cultures from direct-sales organizations to dot-coms, street-vendor businesses to megacorporations, as well as working women and the working poor in different cultures.

**ANTH 383** [Globalization in Everyday Life](#) 3
Overview of how globalization impacts everyday life in the United States and in other cultures around the world. Uses anthropological perspective to examine aspects of everyday life with which students have personal experience, such as clothes, sports, music, cell phones.

**ANTH 390** [Colloquium](#) 3
REQUIREMENTS: Requires a GPA of 3.0 or higher.

**ANTH 401** [The Idea of Race](#) 3
The idea of race in historical and anthropological perspective. The interpretation of racial differences in 18th and 19th century Europe and America and an examination of modern approaches to the question of human variability. RESTRICTIONS: Requires permission of instructor.

**ANTH 404** [Human Osteology](#) 4
The identification of the human skeleton, including complex and fragmentary materials. Basic bone growth, bone pathology, paleopathology and forensic identification. RESTRICTIONS: Requires permission of instructor.

**ANTH 424** [Introduction to Archaeological Field Methods](#) 1-6
Excavation at selected sites; laboratory work and field trips to museum sites.

**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 crosslisted with ARTH457.

**ANTH 463** [Historical Archaeology and the Public](#) 3
Provides practical experience through involvement in a project at an agency, research center or museum which researches, interprets, administers and preserves historical archaeological resources for the public. For students planning careers in historical archaeology, public history, university teaching, the museum field and historic preservation. May be crosslisted with HIST463, MSST463.

**ANTH 466** [Independent Study](#) 1-6

**ANTH 475** [The Teaching of Anthropology](#) 3
Emphasis on the structure and coherence of the discipline - identifying central questions and assembling relevant data - as seen from the perspective of an anthropologist offering an introductory-level survey course. PREREQ: 15 hours of anthropology. RESTRICTIONS: Requires permission of instructor teaching the introductory course. Tutorial and primarily for majors.

**ANTH 486** [Tutorial in Social and Cultural Anthropology](#) 3
History, theory and method in the field of social and cultural anthropology. RESTRICTIONS: Open to majors only. Requires permission of instructor.

**ANTH 487** [Tutorial in Archaeology](#) 3
History, theory and method in the field of archaeology. RESTRICTIONS: Open to majors only. Requires permission of instructor.

**ANTH 488** [Tutorial in Physical Anthropology](#) 3
History, theory and method in the field of physical anthropology. RESTRICTIONS: Open to majors only. Requires permission of instructor.

**ANTH 489** [Tutorial in Applied Anthropology](#) 3
Provides an advanced, in depth synthesis of subfield of applied anthropology. Examines history of the subfield, current debates regarding applied and public anthropology, and applicability of anthropological methods to the world beyond the academy. Divided into three sections: history of applied anthropology, ethnographic methods (theoretical and applied implications, qualitative and quantitative methodology) and supervised original research. RESTRICTIONS: Open to anthropology majors only.

**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 624** [Intro Archaeological Field Methods](#) 1-6
Field-based training in archaeological excavation at selected sites, lab work, and introduction to research and public engagement.

**ANTH 657** [Survey of African Art](#) 3
Major African art styles, their interrelationships, the context of usage and the meanings of African artworks. May be crosslisted with ARTH657.
ANTH 663  HISTORICAL ARCHEOLOGY AND THE PUBLIC  3
Provides practical experience through involvement in a project at an agency, research center or museum which researches, interprets, administers and preserves historical archeological resources for the public. For students planning careers in historical archeology, public history, university teaching, the museum field and historic preservation. May be crosslisted with HIST663, MESS663.

APPLIED ECONOMICS AND STATISTICS

APEC 100  SUSTAINABLE DEVELOPMENT  3
Surveys pressing issues in the management of natural resources, environmental protection, and international development. Requires critical evaluation of these issues by applying basic policy analysis, considering the ethical dimensions of policy, and drawing on economic indicators of environmental quality and human health.

RESTRICTIONS: Students with majors in the College of Agricultural and Natural Resources cannot use this course to satisfy College Breadth requirements in their major.

APEC 110  INTRODUCTION TO FOOD AND AGRIBUSINESS INDUSTRY  1
Introduction to the food and agribusiness industry. The economic structure and importance of the industry is discussed.

APEC 135  INTRODUCTION TO DATA ANALYSIS  3
Introduction to computer systems, with an emphasis on microcomputer systems, and their use to process and analyze data.

RESTRICTIONS: Students with majors in the College of Agricultural and Natural Resources cannot use this course to satisfy College Breadth requirements in their major.

APEC 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.

APEC 165  THE FREC FIRST YEAR EXPERIENCE  1 PF
Provides practical skills and information necessary for success in college and professional career. Focuses on academic services, campus resources and career opportunities.

RESTRICTIONS: Freshmen only.

APEC 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.

APEC 212  FOOD RETAILING AND CONSUMER BEHAVIOR  3
Topics include consumer market environment, demographic characteristics of the population, food retail marketing and financial strategies, product merchandising, new product development strategies and site location analysis.

APEC 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 APEC150 or ECON151

APEC 270  BIOTECHNOLOGY: SCIENCE AND SOCIOECONOMIC ISSUES  3

APEC 302  MANAGEMENT OF AGROBUSINESS FIRMS  3
Principles and practical problems of firm management (decision-making) and planning.

PREREQ: APEC150 or ECON151. RESTRICTIONS: Not open to freshmen or sophomores except by permission of instructor.

APEC 305  MANAGEMENT AND LEADERSHIP DEVELOPMENT  3
Exposes students to food and agribusiness human resource management and employee development. Emphasis on the functions of management, leadership principles, effective supervision, training programs, employee and management appraisal systems, role of minorities in management and ethics in management.

APEC 316  ECONOMICS OF BIOTECHNOLOGY AND NEW TECHNOLOGIES  3
Introduction to the economic explanations for new technologies, innovation and adoption. Biotechnology issues include consumer acceptance, labeling, risk assessment, market structure, trade, patents and the environment. Other current technologies and the future are examined.

APEC 324  INTRODUCTION TO RESOURCE ECONOMICS  3
Introduction to efficient allocation of natural resources over time and uses by competitive market; sources of market failures and their effects on allocative efficiency; and the effects of economic policies on addressing market failures.

PREREQ: APEC150 or ECON151. RESTRICTIONS: Credit cannot be received for both APEC324 and APEC424.

APEC 335  ADVANCED DATA MANAGEMENT  3
Introduction to database structure and management using computer software to collect, manage, transform, and analyze medium to large data sets. The emphasis will be practical applications and development of data skills.

PREREQ: APEC135.

APEC 343  ENVIRONMENTAL ECONOMICS  3
Analyzes benefits and costs of environmental policy; reviews valuation techniques; assesses efficiency of decentralized, regulatory, tax and marketable permit policies to protect the environment. Uses graphical (non-calculus) economic analysis.

May be crosslisted with ECON343. PREREQ: ECON101 or APEC150.

RESTRICTIONS: Credit cannot be received for both APEC343 and APEC444.

APEC 345  STRATEGIC SELLING AND BUYER COMMUNICATION  3
Application of strategic selling techniques to actual selling situations. Focus on technical and personal sales. Involves extensive use of videos, case problems, sales presentations and traveling with sales professionals.

APEC 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: APEC150, and APEC201 or ACCT207. RESTRICTIONS: Designed for students without farm background.

APEC 366  INDEPENDENT STUDY  1-6

APEC 399  TEACHING ASSISTANT  1-2 PF
Practical teaching experience. Students participate and assist in the instruction of an undergraduate course.

RESTRICTIONS: A GPA of 2.75 (3.00 in major) is required. Students must have taken the course.

APEC 401  INTRODUCTION TO OPERATIONS RESEARCH  3
Introduces to the methodologies of operations research with particular focus on their application in areas such as agriculture, environmental systems, health care, manufacturing and transportation. Case studies and applied problem solving are emphasized.

PREREQ: MATH241 and MATH242

APEC 404  FOOD AND FIBER MARKETING  3
System approach to food and fiber marketing analysis: consumer, retail, processor, wholesaler 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.

APEC 406  AGRICULTURAL AND NATURAL RESOURCE POLICY  3
Agricultural and natural resource policy formation, effects of policy on resource allocation and economics of alternative programs. Analysis of effects of various programs on producers, consumers and taxpayers, especially contemporary issues and market failures.

PREREQ: APEC150 or ECON151.

APEC 408  STATISTICAL RESEARCH METHODS  3
An introductory statistics course for advanced undergraduate and graduate students with applications for life sciences, business, health, engineering, and the social sciences. The course managing and describing data; the normal, t, f and chi-squared distributions; the logic of inference; inferential statistics for one and two sample problems; analysis of table data; analysis of variance; and multiple regression. The course is taught using statistical software.

Crosslisted with STAT408.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APEC 409</td>
<td>SURVEYS AND ECONOMIC EXPERIMENTS</td>
<td>3</td>
<td>Research methods for the social sciences from surveys to lab and field experiments with a focus on consumer behavior and resource management issues. Emphasis on designing, conducting and reporting results from research and learning to critically read results from other studies. Data issues and data analysis and modeling techniques will be discussed including graphical methods, inference, and multiple regression. PREREQ: STAT 200 or equivalent.</td>
</tr>
<tr>
<td>APEC 410</td>
<td>INTERNATIONAL AGRICULTURAL TRADE AND MARKETING</td>
<td>3</td>
<td>The global economy and role of government and other institutions in setting agricultural trade policy. Trade theories and theoretical foundations of the economics of international agricultural trade. Current issues and analytical methods of international agricultural trade. PREREQ: APEC150 or ECON151.</td>
</tr>
<tr>
<td>APEC 412</td>
<td>STRATEGIC MARKETING COMPETITION</td>
<td>1-3</td>
<td>Strategic marketing of a new food or fiber product/service. Development of a marketing plan and communicating the plan effectively in local and national competition. RESTRICTIONS: Requires permission of instructor.</td>
</tr>
<tr>
<td>APEC 420</td>
<td>AGRICULTURE IN ECONOMIC DEVELOPMENT</td>
<td>3</td>
<td>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. PREREQ: APEC150 or ECON 151.</td>
</tr>
<tr>
<td>APEC 424</td>
<td>RESOURCE ECONOMICS</td>
<td>3</td>
<td>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: APEC150 or RESTRICTIONS: Credit cannot be received for both APEC324 and APEC424.</td>
</tr>
<tr>
<td>APEC 427</td>
<td>AGREBUSINESS FINANCIAL MANAGEMENT</td>
<td>3</td>
<td>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: APEC201 or ACCT207, and a statistics course.</td>
</tr>
<tr>
<td>APEC 429</td>
<td>COMMUNITY ECONOMIC DEVELOPMENT</td>
<td>3</td>
<td>Community economic development in the United States; application of economic principles regarding industrial location, land use, environmental protection, and economic growth and public service provision; and economic development policies. PREREQ: APEC150 or ECON151.</td>
</tr>
<tr>
<td>APEC 430</td>
<td>ESTABLISHING AND MANAGING A FOOD AND AGREBUSINESS ENTERPRISE</td>
<td>3</td>
<td>Analysis of the necessary factors to consider in initiating a Food and Agribusiness enterprise. Including strategic marketing concepts, competitive, communication, site, and financial strategies, management structure and legal forms of small businesses, etc. Involves case studies and writing a business plan.</td>
</tr>
<tr>
<td>APEC 444</td>
<td>ECONOMICS OF ENVIRONMENTAL MANAGEMENT</td>
<td>3</td>
<td>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. May be crosslisted with ECON444. PREREQ: One of ECON251, ECON300 OR ECON301. RESTRICTIONS: Credit cannot be received for both APEC343 and APEC444.</td>
</tr>
<tr>
<td>APEC 450</td>
<td>TOPICS IN ENVIRONMENTAL LAW</td>
<td>3</td>
<td>Overview of the legal process and environmental laws in order to understand policy issues and learn action processes in the environmental field. May be crosslisted with LEST450.</td>
</tr>
<tr>
<td>APEC 464</td>
<td>INTERNSHIP</td>
<td>1-3</td>
<td>Practical experience acquired by working with corporate and government institutions. Internship sponsor, performance evaluation, and written reports are required. RESTRICTIONS: A maximum of three credits may be applied to the B.S. in Agriculture with a major in Food and Agribusiness Management.</td>
</tr>
<tr>
<td>APEC 465</td>
<td>SEMINAR</td>
<td>1</td>
<td>Oral and written reports in the subdisciplines of food and resource economics.</td>
</tr>
<tr>
<td>APEC 466</td>
<td>INDEPENDENT STUDY</td>
<td>1-6</td>
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<tr>
<td>APEC 471</td>
<td>FUTURES AND OPTIONS MARKETS</td>
<td>3</td>
<td>Analysis of futures and options markets of agricultural and nonagricultural commodities. Trading and hedging theory and techniques, cash and futures price relationships. Students trade commodities via a satellite information system. May be crosslisted with ECON471. PREREQ: One of APEC404, ECON251, ECON300 or ECON301.</td>
</tr>
<tr>
<td>APEC 480</td>
<td>GEOGRAPHIC INFORMATION SYSTEMS IN NATURAL RESOURCE MANAGEMENT</td>
<td>4</td>
<td>Introductory hands-on training in geographic information systems for environmental and natural resource management.</td>
</tr>
<tr>
<td>APEC 601</td>
<td>SURVEY OPERATIONS RESEARCH I</td>
<td>3</td>
<td>Covers various deterministic mathematical programming methods (LP, integer dynamic), network models and queuing theory models. PREREQ: Requires permission of instructor.</td>
</tr>
<tr>
<td>APEC 602</td>
<td>SURVEY OPERATIONS RESEARCH II</td>
<td>3</td>
<td>Covers various stochastic operations research models including decision theory, game theory, project planning, inventory models, simulation, markov decision processes and Queuing models. PREREQ: STAT601</td>
</tr>
<tr>
<td>APEC 603</td>
<td>SIMULATION MODELING AND ANALYSIS</td>
<td>3</td>
<td>Instructors from hard sciences and social sciences introduce real-world Operations Research case studies based on their expertise. Students implement proposed solution methodologies using a variety of available computer software packages. PREREQ: APEC601 or permission of instructor.</td>
</tr>
<tr>
<td>APEC 609</td>
<td>SURVEYS AND ECONOMIC EXPERIMENTS</td>
<td>3</td>
<td>Research methods for the social sciences from surveys to lab and field experiments with a focus on consumer behavior and resource management issues. Emphasis on designing, conducting and reporting results from research and learning to critically read results from other studies. Data issues and data analysis and modeling techniques will be discussed including graphical methods, inference, and multiple regression. PREREQ: STAT200 or equivalent.</td>
</tr>
<tr>
<td>APEC 611</td>
<td>REGIONAL WATERSHED MANAGEMENT</td>
<td>3</td>
<td>Reviews the practical applications of watershed planning as a tool to manage land, water and ecosystem resources. Explores public policies and practices of watershed planning by examining case studies. Uses a multidisciplinary approach involving the fields of geography, environmental science, geology, public policy, land planning, geographic information systems (GIS) and engineering. Crosslisted with UAPP611.</td>
</tr>
<tr>
<td>APEC 615</td>
<td>ADVANCED PRICES AND STATISTICS</td>
<td>3</td>
<td>Statistical tools used in agricultural economics research and operations research. Introduction to econometric specifications, estimation and interpretation.</td>
</tr>
<tr>
<td>APEC 650</td>
<td>URBAN TRANSPORTATION SYSTEMS</td>
<td>3</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. Crosslisted with CIEG650.</td>
</tr>
<tr>
<td>APEC 664</td>
<td>OPERATIONS RESEARCH INTERNSHIP</td>
<td>1-6 PF</td>
<td>Supervised, on-the-job experience, performing technical work for clients including OR applications, econometrics and statistical applications. RESTRICTIONS: Requires permission of instructor.</td>
</tr>
<tr>
<td>APEC 682</td>
<td>SPATIAL ANALYSIS OF NATURAL RESOURCES</td>
<td>3</td>
<td>Advanced hands-on training in geographic information systems and spatial statistics for environmental and natural resource management.</td>
</tr>
<tr>
<td>APEC 690</td>
<td>OPERATIONS RESEARCH SEMINAR</td>
<td>0 PF</td>
<td>Seminars to be given by faculty and by visiting academia, industry and government persons. Graduate students provide topical insights in significant methods and results of current research in operations research.</td>
</tr>
<tr>
<td>APEC 801</td>
<td>APPLIED DEMAND AND MARKETING ANALYSIS</td>
<td>3</td>
<td>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.</td>
</tr>
</tbody>
</table>
APEC 802 OPERATIONS RESEARCH APPLICATIONS 3
Applications of models and principles of basic interest to the theory and practice of operations research. Classic models of inventory and queueing theories, maintenance and replacement of equipment and government planning. Contemporary models from research literature of energy management, urban planning, artificial intelligence and flexible manufacturing systems. COREQ: MATHS29, STAT1601 or MATH360.

APEC 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. PREREQ: APEC608.

APEC 807 MATHEMATICAL PROGRAMMING WITH ECONOMIC APPLS 3
The development of optimization models and methods such as linear, integer, nonlinear, and goal programming. Applications to both firm and sector-level economic issues with emphasis on agricultural, environmental and resource economic applications. PREREQ: APEC601 or permission of Instructor.

APEC 810 INTERNATIONAL AGRICULTURAL TRADE SPECIAL TOPICS 3
The global economy and role of government and other institutions in setting agricultural trade policy. Theoretical and empirical foundations of international agricultural trade and investment. Current issues and econometric methods of international agricultural trade.

APEC 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.

APEC 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 crosslisted with ECON827. PREREQ: ECON801 and an econometrics/statistics course. RESTRICTIONS: Requires permission of instructor.

APEC 834 SEMINAR IN RESOURCE ECONOMICS 3
Quantitative analyses of natural resource markets, resource depletion and the design of optimal management strategies.

APEC 868 RESEARCH 1-9

APEC 869 MASTER'S THESIS 1-6

APEC 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.

APEC 969 DOCTORAL DISSERTATION 1-12 PF

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.

ARAB 106 ARABIC II - ELEMENTARY/INTERMEDIATE 4
Completion of basic Arabic. Increasing mastery of the basic skills of speaking, listening, reading and writing. PREREQ: ARAB105. RESTRICTIONS: Two to three years of high school Arabic acceptable in lieu of ARAB105.

ARAB 107 ARABIC III - INTERMEDIATE 4
Review of grammar, continued practice in speaking and writing, and reading texts of average difficulty. PREREQ: ARAB106. RESTRICTIONS: Four years of high school Arabic acceptable in lieu of ARAB106. Satisfies Arts and Sciences foreign language requirement.

ARAB 200 ADVANCED INTERMEDIATE ARABIC 3
A continuation of ARAB107. Emphasis is on reading and viewing authentic materials from Arab media, in order to improve reading, writing and listening skills and to increase knowledge of Arab culture. PREREQ: ARAB107

ARAB 201 ARABIC GRAMMAR AND COMPOSITION 3
Focuses on increasing knowledge of Arabic Grammatical system and improving writing skills. Emphasis is on grammar. PREREQ: ARAB107

ARAB 205 ARABIC CONVERSATION 3
Focuses on improving oral communication skills through discussion of various topics related to modern, social and cultural life in the Arab World. It includes grammar review and writing practice. PREREQ: ARAB200

ARAB 206 CULTURE THROUGH CONVERSATION 3
Taught abroad and focuses on topics drawn from contemporary Arab life discussing aspects of modern Arab culture. PREREQ: ARAB107 or equivalent. RESTRICTIONS: Requires permission of instructor.

ARAB 208 CONTEMPORARY NORTH AFRICA 3

ARAB 301 ADVANCED READING IN ARABIC 3
Taught sequentially, directly following ARAB205. Introduces students to new grammar through reading comprehension, vocabulary, conversation and essay writing. PREREQ: ARAB205.

ARAB 305 CONVERSATION AND COMPOSITION 3
Fosters the four language skills with a particular focus on conversation and composition. Using Al-Kitaab Part II the most advanced part in the series Al-Kitaab textbook we will be discussing topics relevant to modern Arab society and culture such as development, education, the role of poetry, minorities in the Arab world, freedom and repression, political Islam. PREREQ: ARAB205.

ARAB 366 INDEPENDENT STUDY 1-6

ARAB 401 READING FICTION IN ARABIC: SHORT STORY AND PLAY 3
Using short stories and plays by contemporary authors this course will introduce students to the use of literary Arabic. We will read, translate selected passages and act selected scenes from the plays. PREREQ: ARAB305.

ARAB 405 ADVANCED ARABIC THROUGH MEDIA 3
Through the study of printed and video media materials this course focuses on the reading, listening and translation skills. We will be discussing articles and watching videos on aspects of current events in the Arab world. PREREQ: ARAB 305.

ARTS AND SCIENCE

ARSC 100 PASSPORT TO THE LIBERAL ARTS 1
This seminar provides a college-wide introduction to the breadth and depth of inquiry through general education and the major that is the hallmark of a liberal arts B.A. degree. Supports integrative liberal learning and addresses relevance of the liberal arts in preparing students for the career demands of a 21st century knowledge-based global economy. COREQ: UNIV101.

ARSC 120 TRANSFER STUDENT TRANSITION SEMINAR 1
The Transfer Student Transition seminar is a one-credit course designed to facilitate the successful transition of CAS transfer students. Provide information about managing transition, setting goals, and learning about College and University resources.

ARSC 150 FOUNDATIONS OF ENGLISH FOR ACADEMIC PURPOSES 3-6
An integrated-skills English for Academic Purposes course, with a focus on cultural studies and university preparation. The learning outcomes emphasize oral and written fluency and accuracy, intensive and extensive reading, fundamentals of library research, and appropriate academic source use. Students must demonstrate the ability to understand and use English in a wide range of university contexts, including lectures, class discussions, group work, individual assignments, and informal conversation. RESTRICTIONS: Requires permission of Department.

ARSC 166 SPECIAL PROBLEM 1-3

ARSC 266 SPECIAL PROBLEM 1-3
ARSC 293 HONORS FORUM  1-12
Topics vary.
RESTRICTIONS: May be repeated for credit when topics vary.

ARSC 295 ARTS FORUM  1-12
Attendance at, and critical appreciation of, performing arts events and visual arts events.
RESTRICTIONS: May be repeated for credit when topics vary.

ARSC 296 FORUM: MULTICULTURAL  1-12
Recent topics include Passing the Torch: An Interdisciplinary Look at a World Poised for Change; Living in History; Representations of Race, Class and Gender in the Media; Sexual Identity in Contemporary Culture.
RESTRICTIONS: May be repeated for credit when topics vary.

ARSC 297 PASSPORT TO THE ARTS  1-3
Provide students with an overview of the arts at UD and the opportunity to discover the ways in which the arts can inform and contribute to a variety of disciplines. Additionally, students will be expected to attend UD visual and performing arts events on campus for maximum exposure to the rich cultural life available to them as students.
RESTRICTIONS: May be repeated for credit if topics vary.

ARSC 298 PASSPORT TO THE HUMANITIES  1-3
Provide students with an overview of the humanities at UD and the opportunity to discover the modes of looking, listening, reading, writing, and thinking that inform the humanities. Students will be expected to attend humanities lectures and programs on campus in order to experience the ways in which humanists interpret cultural productions and historical events.

ARSC 299 PASSPORT TO THE SOCIAL SCIENCES  1-3
An overview of the social sciences, including the disciplinary fields, contemporary subjects, social research methods, and prominent figures at UD and in the broader discipline. Discover how the social sciences examine society and human behavior, and how the two interact. Students will attend speaker series events, student research presentations, and workshops that expose them to campus resources (e.g., special collections, laboratories, and centers) that support the social sciences.

ARSC 300 ISSUES IN GLOBAL STUDIES  1 PF
Lecture series devoted to the discussion of global issues.

ARSC 316 PEER TUTORING/ADVANCED COMPOSITION  3
Trains a selected group of upper-division students in writing techniques by applying recent composition theories to students' own writing. Explores and evaluates fundamental theories of teaching writing. May be crosslisted with ENGL316.

ARSC 320 RESEARCH IN AREA STUDIES  1 PF
Lecture series in which faculty from all area studies programs and disciplines present their research on a given topic.

ARSC 366 INDEPENDENT STUDY  1-6

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

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

ARSC 466 INDEPENDENT STUDY  1-6

ARSC 480 ISSUES IN HEALTHCARE FOR CHILDREN AND FAMILIES  3
Students accepted into the Medical Scholars Program are required to perform 1 of 3 designated practica within a structured medical community setting. This practica involves a unique one-on-one interaction with a physician mentor, usually at Christiana Hospital. Students required to work a minimum of 135 hours within the field of pediatrics and/or family practice. A weekly seminar required with the faculty coordinator and medical mentor.
RESTRICTIONS: BALS MSP majors only and junior status or above with permission of instructor.

ARSC 482 ISSUES IN PUBLIC HEALTHCARE - ECONOMICS  3
Students accepted into the Medical Scholars Program are required to perform 2 of 3 designated practica options within a structured medical community setting. This practica involves a unique one-on-one interaction with a physician mentor, usually at Christiana Hospital. Students are required to work a minimum of 135 hours within a Public Health related field. A weekly seminar is required with the faculty coordinator and medical mentor.
RESTRICTIONS: BALS MSP majors only and junior status or above.

ARSC 866 SPECIAL PROBLEM  1-12

ARSC 869 MASTER'S THESIS  1-6

ART 110 DRAWING I  3
What do we see versus what we think we see? Perceptual drawing as a language and means of communication for artists and designers. Projects in and development of technical skills through basic drawing media explore drawing in its various forms: process/investigation, proposal, document, and artifact.
COREQ: ART111 and ART116. RESTRICTIONS: Open to majors only.

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

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

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

ART 116 INTRODUCTION TO DIGITAL MEDIA  3
Introduction to digital media as an investigative and creative tool in art and design. Students are exposed to digital photography, image and text creation and manipulation, and the Internet through software-based projects. Working in groups, students create collaborative web or time-based projects.
COREQ: ART110 and ART111. RESTRICTIONS: Open to Majors only.

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

ART 118 FOUNDATIONS COLLOQUIUM  1 PF
A forum introducing projects and fundamental principles of art and design. Explore opportunities for department majors and undergraduate research. Contemporary visiting artists and faculty presentations engage students in critical thinking and writing. Instruction on utilizing campus and online resources to achieve foundation year goals.
COREQ: ART110 or ART111 or ART112 or ART113 or ART116 or ART117.
RESTRICTIONS: ART majors only.

ART 129 DESIGN FOR NON-MAJORS  3
Introduction to art and design principles within creative problem solving assignments using 2-dimensional and 3-dimensional media. Design organization criteria, technical craftsmanship, and artistic objectives interconnect to support production of original expressive statements.
RESTRICTIONS: Open to non-majors.

ART 133 DRAWING FOR NON-MAJORS  3
Projects involving black-and-white and color studies in a variety of media, including charcoal, pencil, ink, and pastels.
RESTRICTIONS: Open to non-majors.
ART 180  DIGITAL PHOTOGRAPHY FOR NON-MAJORS 3
Introduces the basics of photography as a way to communicate ideas emphasizing content, composition, and technique. Examines contemporary artists and historic movements through research, gallery visits and lectures. Using a digital camera and visual editing software students create, edit and critique images. RESTRICTIONS: Open to non-majors.

ART 200  INTRODUCTION TO VIDEO GAME DESIGN 3
Students will learn game theory, animation, and design. Intended for students from across the university, no experience with making art or knowledge of computer programming is required. Students will work individually and in groups to design and develop working video games.

ART 202  TYPOGRAPHY I 3
Introduction to fundamentals of typography and the study of letterforms: history of the modern alphabet, type classification, effects of printing technology (i.e. letterpress) on typography, drawing letterforms, constructing letterforms, designing a page with type. RESTRICTIONS: Open to VC-BFA Majors Only.

ART 203  TYPOGRAPHY II 3
Further development in use of typography for communication: grid systems, effects of context on legibility and readability, type in sequence (i.e. books, animation, interactivity), typographic systems and modernist grid compositions in publications, use of computer as tool for typographic projects, introduction to design theory (i.e. semiotics) as it applies to typography. PREREQ: C- or better in ART202 AND ART206. RESTRICTIONS: Open to VC-BFA Majors Only.

ART 204  MEDIA/DESIGN/CULTURE 3
Current and historical media processes and their impact on art, design and culture. Image making and manipulation, video, audio, interactivity, and connectivity. Viewing fine art and design projects, the historical aspects of design and digital media, basic media theory, and universal principles of software and digital media. Projects include writing, creating visual media, and making presentations. Unfamiliar media experienced firsthand through exhibitions, screenings, lectures, online exploration and consumer media devices.

ART 205  CORE INTERACTIVE MEDIA 3
Introduction to interactive media and concepts of interaction design. Students learn the basics of coding and programming languages that are fundamental to human-computer interaction and strategies for understanding users and prototyping designed experiences with media. RESTRICTIONS: ART-BAAS.

ART 206  FORM AND COMMUNICATION I 3
Students create images by hand to use for graphic design communication, learning techniques and processes that communicate concepts. These processes and techniques are applied by using illustrative and representative imagery to communicate ideas in graphic design systems. RESTRICTIONS: Open to VC-BFA Majors Only.

ART 207  FORM AND COMMUNICATION II 3
Development of image-making techniques and processes with the intention to communicate: graphic translation and representation, digital and analog processes, semantics, design systems. Utilization of design fundamentals for composition and communication of visual form. PREREQ: C- or better in ART202 AND ART206. RESTRICTIONS: Open to VC-BFA Majors Only.

ART 208  CORE TYPOGRAPHY 3
Fundamentals of typography and the study of letterforms, history of the modern alphabet, type classification, effects of printing technology on typography, drawing letterforms, constructing letterforms, designing a page with type. RESTRICTIONS: ART-BAAS.

ART 209  CORE DESIGN 3
Dynamic shaping of surface and space for expressive communication with an emphasis on organizational principles in representational, abstract and non-objective formats. Students give multi-sensory form to original concepts. RESTRICTIONS: ART-BAAS.

ART 215  SEEING AND BEING 3
Focuses on how people see, process and respond to visual information embedded in the world, from immediate personal environments to the larger places in which we live. Visual impact and social action are explored within contexts of change. Design thinking and innovation processes are highlighted.

ART 218  CORE COLLOQUIUM 1 PF
A forum introducing projects and fundamental principles of art and design. Explore opportunities for department majors and undergraduate research. Contemporary visiting artists and faculty presentations engage students in critical thinking and writing. Instruction on utilizing campus and online resources to achieve core curriculum goals. RESTRICTIONS: ART-BAAS.

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

ART 231  INTRODUCTION TO PAINTING 3
An exploration of beginning oil painting methods and material through both traditional and conceptual painting ideas, providing the student with a foundation for discovering their unique potential for self-expression.

ART 233  DRAWING AS STUDY 3
Develop both a technical and conceptual understanding of the methods behind the drawing process. Analyze the systems involved in transferring the three-dimensional world to a two-dimensional surface. Discussions about light and shadow, surface texture, perspective, and, in particular, linear structure, as well as the various ways these conditions reveal themselves visually. The prior concepts will be used as the foundation on which to build more advanced understanding of how drawing might be used to investigate the physical world, and what might differentiate it from other ways of recording. Repeatable for 6 credits. RESTRICTIONS: May be repeated for six credits.

ART 235  CORE DRAWING 3
What do we see versus what we think we see? Perceptual drawing as a language and means of communication for artists and designers. Projects in and development of technical skills through basic drawing media explore drawing in its various forms: process/investigation, proposal, document, and artifact. RESTRICTIONS: For ART-BAAS Majors only.

ART 236  CORE PAINTING 3
A study of color theory and formal design elements through the use of beginning oil painting methods and materials, exploring traditional and conceptual painting ideas, provides a foundation for discovery of self-expression. RESTRICTIONS: ART-BAAS.

ART 243  INTRODUCTION TO PRINTMAKING 3
Introduction to a variety of print techniques including digital, silkscreen, etching, and woodcut, and for developing multiple and one of a kind images.

ART 245  CORE PRINTMAKING 3
An introductory printmaking course designed specifically for Art majors. Projects are designed to allow students to demonstrate an understanding of the multiple facets of printmaking. Hands on experience in screen-printing, monotype, intaglio, relief and screen printmaking will be covered. RESTRICTIONS: For ART-BAAS majors only. This course has a consumable fee.

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

ART 250  INTRODUCTION TO SCULPTURE 3
Introduction to a wide variety of construction techniques and tools to create sculpture working in metal and wood including welding and woodshop equipment.

ART 255  CORE SCULPTURE 3
Introduction to the fundamental issues to creating sculpture including processes, content and spatial relationships. Introduced to welding, casting and woodworking techniques through a variety of materials and equipment. RESTRICTIONS: ART-BAAS. This course has a consumable fee.

ART 265  CORE 3-D MODELING 3
Introduction to using software to create 3D models and computer animations. Students will be given a comprehensive introduction to the various components including modeling, animating, rendering and lighting. RESTRICTIONS: ART-BAAS.

ART 280  INTRODUCTION TO PHOTO AND VIDEO 3
Introduction to digital photography, video, and sound art. Explore lens-based and time-based uses of the camera and computer. Investigate collaborative methodologies and critical study of media culture and relationships to digital technology in an image-saturated society.
ART 281 DARKROOM PHOTOGRAPHY 3
Explores the concepts and tools of black & white photography while studying photographic movements such as conceptual photography, portraiture, landscape, social documentary, and the manipulated image. Includes analog camera, flash, and darkroom techniques.

ART 284 CORE PHOTOGRAPHY 3
Explores the tools, movements and critical concepts of analog and digital photography as well as basic lighting techniques through a series of interlocking lectures, exercises and visual problems. Course has a consumable fee.
RESTRICTIONS: ART-BAAS. Course has a consumable fee.

ART 285 CORE MOVING IMAGES 3
Introduction to digital video, animation, and sound recording. Explore time-based uses of the camera and computer through hands-on projects. Explores cultural and historical fascination with time, motion, and light through screenings, lectures, and readings. Course has a consumable fee.
RESTRICTIONS: ART-BAAS. Course has a consumable fee.

ART 289 DOCUMENTARY PHOTOGRAPHY 3
Introduces critical issues and practices in documentary photography and video. Explores the influence of social documentarians. Examines the relationship of words and image, the role of photo editors and the development of the photo-essay through discussion and studio experience.

ART 290 INTRODUCTION TO CERAMICS 3
Introduction to the tools, processes and aesthetics of ceramics.

ART 295 CORE CERAMICS 3
First-year majors are introduced to both the fundamentals of working with clay, and the fundamentals of an artistic practice. What does it mean to think with and through a material? Process and engaged intervention will be emphasized, with strong encouragement for experimentation and creativity. Course has a consumable fee.
RESTRICTIONS: ART-BAAS. Course has a consumable fee.

ART 300 EXPERIMENTAL TYPOGRAPHY 3
Exploration of advanced typography in multiple media and for multiple purposes related to visual communications, including on-and-off-screen media, (i.e. motion graphics, illustration, graphic design, typeface design and publication design).
PREREQ: ART203 or ART243. RESTRICTIONS: Open to BFA and Art Majors Only.

ART 301 DESIGN STUDIO 3
Designed to emulate a professional design studio practice. Students develop skills in collaboration, client relations, production and advanced media applications in conjunction with a refined development of personal creative process and awareness of cultural contexts.
PREREQ: C- or better in ART302 and ART303 or ART308. RESTRICTIONS: Open to VC-BFA Majors only.

ART 302 TYPOGRAPHY METHODS 3
Development in use of typography for communication: grid systems, effects of context on legibility and readability, type in sequence, typographic systems and modernist grid compositions in publications, use of computer as tool for typographic projects, introduction to design theory as it applies to typography.
RESTRICTIONS: VC-BFA.

ART 303 DESIGN METHODS 3
Development of image-making techniques and processes with the intention to communicate: graphic translation and representation, digital and analog processes, semiotics, design systems. Utilization of design fundamentals for composition and communication of visual form.
RESTRICTIONS: For VC-BFA Majors only.

ART 307 INTERACTION DESIGN 3
Focusing on the development of meaningful interactions between technology and people, specifically through screen-based interfaces, (computer screens, tablets, smart phones, etc.), students develop skills in planning and producing engaging user experiences, (information architecture, prototyping, user interface design and production), with special attention to conceptualizing innovative uses of new technology and critical evaluation of one's work. Skills in html, css and Adobe Photoshop are required.
RESTRICTIONS: Art Majors and Interactive Media minors only.

ART 308 TYPE AND IMAGE 3
Combining typographic and image-making techniques and processes for communication design. Students use materials and media in an advanced, refined way and develop personal methods for expressing a point of view and communicating ideas.
PREREQ: C- or better in all of the following: ART202, ART203, ART206 and ART207.
RESTRICTIONS: Open to VC-BFA Majors Only.

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 PHOTOGRAPHIC DESIGN 3
Explores photographic imagery in communication design and to understand the creative relationship between image and design. Students develop conceptual and technical skills emphasizing both studio and location assignments for graphic and advertising design projects including editorial, print advertising, posters, collateral materials, books and packaging.
RESTRICTIONS: BFA or permission of instructor. May be repeated for six credits.

ART 312 ILLUSTRATION METHODS 3
Introduction to illustration methods through color mediums such as watercolor, gouache, acrylic oils, and dry color media. Emphasis is on various approaches to illustrated imagery in editorial, book, institutional and advertising contexts.
RESTRICTIONS: BFA or permission of instructor. May be repeated for six credits.

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

ART 317 PRINTMAKING STRATEGIES 3
Different print techniques (screenprint, lithography, relief, etc.) will be explored and exploited for their ability to generate large editions in different formats including zines, books and large-scale print/installations.
PREREQ: ART243 or ART245. RESTRICTIONS: Course has a fee. May be repeated for six credits.

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

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

ART 322 ADVERTISING DESIGN METHODS 3
Introduces basic tools and techniques of modern advertising along with an overview of industry history and practices. Students create advertising strategies and use a variety of media to communicate ideas effectively. Assignments include semester-long and weekly assignments to build strategy, copywriting, and art direction skills.
RESTRICTIONS: VC-BFA or permission of instructor. May be repeated for six credits.

ART 324 THE ART OF SOCIAL CHANGE 3
20th Century international liberation artists’ works are examined from interdisciplinary perspectives. Students will observe and write about art works using behavioral science methods. Interaction with contemporary social change artists and one visual project are part of the course.
May be crosslisted with BAM5324.

ART 326 EXPERIMENTAL ANIMATION 3
Explores experimental techniques in animation through hands-on projects. Addresses fundamental problems such as timing, rhythm, and sound. Explores cultural and historical fascination with animating the inanimate through screenings, lectures, and readings. Includes a variety of formats: traditional, digital, and/or electronic.
PREREQ: ART280 or ART284 or ART285 or ART289 or ART385.

ART 327 EXPANDED PRINTMAKING 3
Exploration of a variety of printmaking techniques including digital, silkscreen etching and woodcut for developing multiple and one of a kind images. Students will be introduced to the contemporary issues and conversations associated with Printmaking as an art form.
PREREQ: ART243 or ART245. RESTRICTIONS: Course has a consumable fee. May be repeated for six credits.

ART 331 INTERMEDIATE PAINTING 3
Identifying and exploring ideas through the development of critical awareness of contemporary painting issues and structures. Emphasis on directed conceptual problems and a variety of materials.
PREREQ: ART231 or ART236.
ART 334 **FIGURE PAINTING** 3
Evolving conceptual and technical solutions to depicting the human figure in oil. Emphasis is on creating a representational and expressive finished product. PREREQ: ART230 and ART231 or ART236. RESTRICTIONS: May be repeated for six credits.

ART 335 **DRAWING APPROACHES** 3
Exploration of drawing using various media. A range of conceptual ideas including representational and abstract concepts. PREREQ: ART112 or ART129 or ART235. RESTRICTIONS: Open to Art Majors and Art Minors only.

ART 341 **ETCHING** 3
Introduction to etching and intaglio printing processes including drypoint, line etching, soft ground, liftground, aquatint techniques and non-toxic photo etching. PREREQ: Open to majors and minors.

ART 343 **LITHOGRAPHY** 3
Introduction to lithographic process, its history and contemporary practice. Emphasizes independent research on both drawn and photographic litho techniques. PREREQ: ART243.

ART 344 **DIGITAL PRINTMAKING** 3

ART 346 **LETTERPRESS PRINTING** 3
Explores the process and product of printing through various media, technology and conceptual approaches. Focuses on text and image relationships by integrating letterpress, woodcut, linoleum blocks, and digital systems. Exploration of processes and results in creation of an edition conceptually centered around individual interests. PREREQ: ART243 or ART207. RESTRICTIONS: ART JR/SR Majors Only. May be repeated for up to six credits.

ART 350 **SCULPTURE PROCESSES** 3
Explores construction techniques and tools to create sculpture, introducing more advanced techniques and information. Pursue individual goals, selecting materials and types of artistic expressions that best suit each individual and creative situation. PREREQ: ART250. May be repeated up to 6 credits.

ART 352 **ILLUSTRATION NARRATIVE I** 3
Introduction to the history, methods, and future of conceptual and narrative illustration. Learn to choose themes and make original stories through image making. Making effective, strong and original layouts is emphasized in this course. Utilize a variety of strategies and methods for image making in physical and digital media.

ART 353 **ILLUSTRATION STUDIO I** 3
Explores conceptual strategies that critically link type and image, and the creative approaches for developing unique visual form to abstract conceptual ideas. Strong emphasis is placed matching form to content, non-literal thinking, and experimentation. Projects are designed to further build a strong conceptual skill base and point of view with the confidence and flexibility to work within conventional, emerging and future markets.

ART 363 **INTRODUCTION TO FASHION AND FASHION PHOTOGRAPHY** 3
Introduction to history of the medium and will cover fashion photography from the early 1900's to the present. The genre of fashion photography is defined in part and is devoted to photographing clothing, models, still life and other fashion. Street fashion will be covered and explored.

ART 366 **INDEPENDENT STUDY** 1-6

ART 370 **SPECIAL TOPICS** 3
Thematically based studio course following faculty research interests. Repeatable for 9 credits. Requires Instructor permission. RESTRICTIONS: Requires instructor permission. May be repeated for nine credits.

ART 382 **ALTERNATIVE PHOTOGRAPHIC PROCESSES** 3
Investigates alternatives within analog and digital media to create unique images exploring 18th - 20th century photographic processes and alternatives. Emphasizes concepts of light-sensitive imaging and investigations of classical and current materials augmenting traditional darkroom photographic processes. PREREQ: ART280 or ART281 or ART284 or ART285 or ART289 or ART344.

ART 384 **PHOTOGRAPHIC STRATEGIES** 3
Expanded exploration of historic and contemporary photographic practice, critical theory and movements. Develop an advanced body of work through selective image processing, printing and portfolio development. PREREQ: ART280 or ART284 or ART285 or ART289. RESTRICTIONS: Course has a consumable fee. May be repeated for six credits.

ART 385 **MOVING IMAGE PRODUCTION** 3
Digital video animation, and time-based installation are contextualized within a tradition of fine art while exploring conceptual, experimental, narrative and documentary methodologies. Investigate lens media through readings, screenings, critiques, and hands-on creation of single and multi-channel video at an intermediate level. PREREQ: ART280 or ART284 or ART285 or ART289. RESTRICTIONS: May be repeated for six credits.

ART 386 **LIGHTING STUDIO** 3
Investigation of light as subject and technique. Hands-on practice for students with interest in film/video, fine-art and applied photography. Explore a variety of lighting problems, concepts, and techniques through a series of intersecting workshops, exercises, and visual projects. PREREQ: ART207 or ART280 or ART281 or ART284 or ART285 or ART289.

ART 390 **CERAMICS-WHEEL THROWING & FIRING** 3
Learn the fundamentals of wheel-throwing with emphasis on imaginative potentials inherent in this technique. Learn basic clay and glaze-mixing chemistry and how to fire electric and gas kilns. Encouraged to experiment in this course. PREREQ: ART290 or ART295. RESTRICTIONS: Open to non-majors. May be repeated for six credits.

ART 391 **CERAMICS A TIME BASED APPROACH** 3
Make clay come alive through a combination of claymation, time-lapse, kiln-based, and site-specific techniques. Projects may explore material and contextual transformations as well as abstract and narrative possibilities. PREREQ: ART290 or ART295.

ART 393 **EXPANDED CERAMIC PROCESSES** 3
Students will explore and research ceramic materials, structures, and transformations in a rich variety of building, glazing, and firing techniques. Focus on material experimentation in group projects and individual investigation. Students will be introduced to contemporary issues/conversations associated with Ceramics as an art form. Course has a consumable fee. Repeatable for 9 credits. PREREQ: ART290 or ART295 or by permission of Instructor. RESTRICTIONS: Course has a consumable fee. May be repeated for nine credits.

ART 400 **VISUAL COMMUNICATIONS PRACTICUM** 3
Designed to introduce Visual Communications BFA seniors to various aspects of a career in visual communications. Faculty and visiting artists and designers are invited to present topics to the class in lecture and discussion formats. Develop an awareness of diverse creative practices. PREREQ: C- or better in ART301 AND ART308. RESTRICTIONS: Open to VC-BFA Majors Only.

ART 401 **PORTFOLIO PREPARATION** 3
Produce a portfolio accurately and effectively showing media proficiencies and ability to communicate ideas and point of view. Develop an awareness of how work and individual strengths relate to the current culture, society and creative business environments, informed by knowledge of contemporary and historical visual communications. PREREQ: C- or better in ART402 and ART409 or ART400. RESTRICTIONS: VC-BFA.

ART 402 **EXPERIMENTAL TYPOGRAPHY** 3
Exploration of advanced typography in multiple media and for multiple purposes related to visual communications, including on-and-off-screen media, (i.e. motion graphics, illustration, graphic design, typeface design and publication design). PREREQ: C- or better in ART301. RESTRICTIONS: VC-BFA.

ART 403 **DEGREE PROJECT** 3
Independent project within Visual Communications disciplines that serves as an in-depth inquiry into a subject of the student's choice, and directly relates to their intended career pathway. Projects are vetted and reviewed by a committee of faculty who serve as advisors. PREREQ: C- or better in ART402 and ART409. RESTRICTIONS: VC-BFA.

ART 406 **ARTIST'S MACHINE** 3
Exploration of artist-constructed machines (i.e. micro-electronics, robotics, kinetic sculpture and interactive installation) as media for artistic expression. Balance of theory and practice with specific emphasis on making of electronic objects and positioning these in various contexts. No prior knowledge of electronics required. May be crosslisted with ARTH408.
ART 407  TOPICS IN ART & TECHNOLOGY 3
Production of large-scale interactive media projects incorporating text, image, video and sound. Topics include theoretical and advanced technical components within a workshop format. Aesthetics, innovation, and cultural awareness are emphasized in creating interactive projects. PREREQ: ART307 or ART385 or ART326. RESTRICTIONS: Art majors and Interactive Media minors only.

ART 408  INTERNSHIP 3
Students have a hands-on professional experience in their field of choice in consultation with Faculty Advisors and interact with professionals in a creative working environment. The internship requires a minimum number of hours in a studio, gallery, design, advertising or related organization. RESTRICTIONS: Junior and Senior BFA Art majors only. May be repeated for up to six credits. Requires permission of instructor.

ART 409  DESIGN CONTEXTS 3
Collaborative approach to large-scale design projects that take advantage of students’ individual skills and unique points of view. Projects are designed to emulate a small creative studio. PREREQ: C- or better in ART301. RESTRICTIONS: VC-BA.

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

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

ART 419  SENIOR STUDIO 3
Students work independently to develop a body of art for BFA exhibition and portfolio. The approach is interdisciplinary and students are encouraged to experiment with a variety of media and collaborate with other artists; critique and discussion emphasize concept and content. PREREQ: ART416 RESTRICTIONS: Art Majors only.

ART 432  PAINTING STUDIO 3
Provides an atmosphere of support for a maturing studio practice. Emphasis on evolving a painting or material awareness in the pursuit of a more personal artistic direction and style. PREREQ: ART311 or ART334. RESTRICTIONS: May be repeated up to nine credit hours.

ART 440  PRINTMAKING STUDIO 3
Emphasizes color printing and integration of advanced printmaking methods and materials. Traditional printmaking techniques and ideas are expanded, experimentation promoted, and new technologies explored. Focuses on individual research through exploring one or more processes. PREREQ: ART243 and ART343, or ART245, or ART246, or ART341. RESTRICTIONS: Art Majors only.

ART 450  SCULPTURE STUDIO 3
Provides for development of a cohesive body of work based on personal thoughts and artistic ideals. Self-directed in collaboration with the instructor. Strong emphasis on individual concerns and interest working three-dimensionally. PREREQ: ART350 RESTRICTIONS: May be repeated up to 9 credits.

ART 466  INDEPENDENT STUDY 1-6

ART 470  SPECIAL TOPICS 3
Thematically based studio course following faculty research interests. Repeatable for 9 credits. Requires permission of Instructor. RESTRICTIONS: Requires permission of Instructor. May be repeatable for nine credits.

ART 481  PHOTO AND VIDEO STUDIO 3
Develop independent work through various stages of production culminating in a completed photo, video, web, or interactive work. Discuss criticism, techniques and contemporary lens media theory at an advanced level. Projects may include experimental techniques, multichannel or gallery-based installation, animation, narrative, and/or documentary approaches. PREREQ: ART307 or ART310 or ART326 or ART384 or ART385 or ART386.

ART 490  CERAMICS STUDIO 3
Curriculum is self-directed in collaboration with the instructor with a strong emphasis on individuality, articulation, and communication. Students will maintain an individual studio practice, participate in written and oral group discussions. PREREQ: ART290 or ART295 and either ART390 or ART391 or ART393. RESTRICTIONS: May be repeated twice for nine credits.

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

ART 606  ARTIST’S MACHINE 3
Exploration of artist-constructed machines (i.e. micro-electronics, robotics, kinetic sculpture and interactive interactive installation) as media for artistic expression. Balance of theory and practice with specific emphasis on making of electronic objects and positioning these in various contexts. No prior knowledge of electronics required.

ART 612  IxD STUDIO 1 6
An integration of content from other IxD courses towards the exploration of interaction design strategies for various contexts and users. Students work closely with faculty advisors to synthesize and develop their ideas and skills, dedicating time to experimentation, problem-based learning and research of individual approaches. RESTRICTIONS: Restricted to MA IxD majors only.

ART 613  IxD STUDIO 2 6
An integration of content from other IxD courses towards the exploration of interaction design strategies for various contexts and users. Students work closely with faculty advisors to synthesize and develop their ideas and skills, dedicating time to experimentation, problem-based learning and research of individual approaches. PREREQ: ART612. RESTRICTIONS: Restricted to MA IxD majors only.

ART 618  IxD INTERNSHIP 3
Hands-on professional experience within an industry or organization directly related to the student’s area of study. Placement requires prior approval by faculty advisors and a minimum of 120 hours of direct experience. A final report detailing this experience must be submitted to receive credit. RESTRICTIONS: Restricted to MA IxD majors only.

ART 670  SPECIAL TOPICS 3
Thematically based studio course following faculty research interests. Repeatable for 9 credits. Requires permission of instructor. RESTRICTIONS: Requires permission of Instructor. May be repeated for nine credits.

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

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

ART 679  GRADUATE STUDIO 3-9
Independent studio practice under the guidance and supervision of graduate advisors.

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 701  ART CONSERVATION FRESHMAN SEMINAR 1 PF
Introduction to the field through exposure to Winterthur Museum, Library and Garden and current art conservation projects. Professional interaction fosters academic and social competencies while explaining education, research, and career opportunities.
ARTC 210 SCIENCE OF COLOR PHENOMENA 4
Introduction to basic physical and chemical principles which describe nature of light and the phenomena of color. Targeted for non-science majors who seek a descriptive understanding of scientific principles underlying formation of color phenomena found in nature and works of art. May be crosslisted with CHEM210, SCEN210. PREREQ: High school chemistry and algebra.

ARTC 301 CARE AND PRESERVATION OF CULTURAL PROPERTY I 3
Examines philosophy, ethics, and practice of material culture preservation and the issues pertaining to collections management of cultural property. Typical deterioration characteristics and preventive conservation alternatives will be presented and discussed.

ARTC 302 CARE AND PRESERVATION OF CULTURAL PROPERTY II 3
This undergraduate course will serve as an introduction to the practice of conservation, specifically conservation documentation. The class will provide students with a basic knowledge of conservation terminology, conservation literature and research resources, methods of conservation documentation, and prepare students for conservation internships. PREREQ: ARTC301

ARTC 390 ART AND FORENSICS: PAINTING 3
The class will introduce the materials and techniques used by Western easel painters from the early Renaissance through the early 20th century and explore how science and analytical methods can answer questions relating to the materials, methods, age, attribution, and authenticity of paintings and artwork.

ARTC 464 PRESERVATION INTERNSHIP 3-6

ARTC 466 INDEPENDENT STUDY 1-6

ARTC 480 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. Studio reconstructions of masterworks, lectures and library research. May be crosslisted with ARTH480. RESTRICTIONS: Requires permission of instructor.

ARTC 485 COLOR MIXING AND MATCHING 3
Lecture-studio presentation covering analytical and practical aspects of mixing and matching colors without instrumentation. Pigments, dyes and the manufacture of paint studied. Major topics include color interaction and the Munsell system of color description.

RESTRICTIONS: Requires permission of instructor.

ARTC 488 STUDIO MATERIALS AND TECHNIQUES OF PAINTING I 3
Major masters and materials, tools, supports and techniques of architectural painting and panel painting in tempera from about 1500 BC to AD 1500. Topics include true fresco and egg tempera painting. Studio reconstructions, lectures and library research. May be crosslisted with ARTH488. RESTRICTIONS: Requires permission of instructor.

ARTC 489 STUDIO MATERIALS AND TECHNIQUES OF PAINTING II 3
Major masters and materials, tools and techniques of indirect and direct oil painting. Time frame: 1500 to present. Major topics include development of canvas, brushes, oil paint, mediums, varnishes, solvents and complex relationship between indirect and direct techniques. Includes studio reconstruction of masterworks, lectures and library research. May be crosslisted with ARTH489. RESTRICTIONS: Requires permission of instructor.

ARTC 490 STUDIO IN THE MATERIALS AND TECHNIQUES OF PRINTMAKING I 3
Major masters and materials, tools and techniques of relief, planographic and intaglio printmaking. Time frame: ca. 1400-1920. Major topics include woodcut, copperplate engraving, etching, drypoint, aquatint, mezzotint, lithograph and wood engraving. Studio reconstructions, lectures and library research. May be crosslisted with ARTH490. RESTRICTIONS: Requires permission of instructor.

ARTC 495 PRESERVATION CAPSTONE 3
Summarize and synthesize the previous three years of a student's undergraduate career in Material Culture Preservation major. Faculty complete the undergraduate experience and prepare students for their next step (job market or graduate school). Career advisement and assessment of learning using exams, the creation of portfolios, oral presentations of internship or research experiences.

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, stuffs, 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: ARTG615 RESTRICTIONS: Full-time fellowship students only.

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

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

ARTC 650 SEMINAR IN ART CONSERVATION 1
Oral reports on current work in the fields of art conservation, art history, ethics, philosophy and museum science. PREREQ: ARTG655 RESTRICTIONS: Full-time fellowship students only.

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

ARTC 655 EXAMINATION AND TREATMENT OF ART OBJECTS II 1-3
Application of scientific and art historical techniques to the examination, treatment and preservation of works of art on paper, library materials, photographs, textiles, paintings, joined wooden objects, decorative, ethnographic, and archaeological objects under the supervision of conservation faculty. PREREQ: ARTG654 RESTRICTIONS: Full-time fellowship students only.

ARTC 658 TOPICS IN ADVANCED APPRENTICESHIP AND RESEARCH IN CONSERVATION I 6
Discussion, demonstration, practice and research relating to the examination, analysis, treatment, and collections care of cultural property including works of art on paper, library materials, photographs, textiles, paintings, joined wooden objects, decorative, ethnographic, and archeological materials. Course requirements may be fulfilled by work in cooperating institutions outside the Winterthur Museum. PREREQ: ARTG654 and ARTG655 RESTRICTIONS: Full-time fellowship students only.

ARTC 659 TOPICS: ADVANCED APPRENTICESHIP AND RESEARCH IN ART CONSERVATION II 6
Discussion, demonstration, practice, and research relating to the examination, analysis, treatment, and collections care of cultural property including works of art on paper, library materials, photographs, textiles, paintings, joined wooden objects, decorative, ethnographic, and archeological materials. Course requirements may be fulfilled by work in institutions outside the Winterthur Museum. PREREQ: ARTG655 and ARTG658 RESTRICTIONS: Full-time fellowship students only.

ARTC 666 INDEPENDENT STUDY 1-12

ARTC 670 CHEMICAL AND PHYSICAL TECHNIQUES USED IN THE EXAMINATION OF ART MATERIALS I 3
Classroom discussion and laboratory application of chemical and physical techniques that art conservators perform to identify and characterize organic art materials.
RESTRICTIONS: Full-time fellowship students only.
ARTC 671 CHEMICAL AND PHYSICAL TECHNIQUES USED IN THE EXAMINATION OF ART MATERIALS II 3
Classroom discussion and laboratory application of chemical and physical techniques that art conservators perform to identify and characterize metals, glass, ceramics, and natural and synthetic polymers. Basic structure, composition and deterioration mechanisms 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 scientist to characterize materials. Application of these techniques to art materials and treatment-related problems stressed.
PREREQ: ARTC670 and ARTC671 RESTRICTIONS: Full-time fellowship students only.

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 688 STUDIO MATERIALS AND TECHNIQUES OF PAINTING I 3
Major masters and materials, tools, supports and techniques of architectural and panel painting in tempera from about 1500 BC to AD 1500. Topics include true fresco and egg tempera painting. Studio reconstructions, lectures and library research.
May be croslisted with ARTH688. RESTRICTIONS: Requires permission of instructor.

ARTC 689 STUDIO MATERIALS AND TECHNIQUES OF PAINTING II 3
Major masters and materials, tools and techniques of indirect and direct oil painting. Time frame: 1500 to the present. Topics include development of canvas, brushes, oil paint, mediums, varnishes, solvents and complex relationship between indirect and direct techniques. Includes studio reconstruction of masterworks, lectures and library research.
May be croslisted with ARTH689. RESTRICTIONS: Requires permission of instructor.

ARTC 690 STUDIO IN THE MATERIALS AND TECHNIQUES OF PRINTMAKING I3
Major masters and materials, tools, and techniques of relief, planographic and intaglio printmaking. Time frame: ca. 1400-1920. Major topics include woodcut, copperplate engraving, etching, drypoint, aquatint, mezzotint, lithograph and wood engraving. Studio reconstructions, lectures and library research.
May be croslisted with ARTH690. RESTRICTIONS: Requires permission of instructor.

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.
RESTRICTIONS: Full-time fellowship students only. May be repeated for up to eighteen credits when topics vary.

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

ARTC 969 DOCTORAL DISSERTATION 1-12 PF

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 representations of deities, heroes and heroines, as well as images with supernatural powers and satirical images.

ARTH 153 INTRODUCTION TO ART HISTORY: PYRAMIDS TO CATHEDRALS 3
Survey of art and architecture from the ancient world through the Middle Ages studied in historical and cultural contexts. Topics include: Egyptian pyramids, ancient Greek and Roman monuments, and medieval manuscripts and cathedrals.

ARTH 154 INTRODUCTION TO ART HISTORY: RENAISSANCE TO MODERN 3
Art and architecture from 1300 to the present studied in historical and cultural context. Topics include art and illusion, the altarpiece, portraiture, the nude, print culture, the changing image of the artist, photography, Impressionism, art and politics, Pop Art, and performance.
RESTRICTIONS: Usually offered in Spring semester.

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

ARTH 158 RULERS’ IMAGES: ANTIQUITY TO THE PRESENT 3
Detailed study or selected rulers from Alexander the Great to American Presidents, as presented in both visual and textual sources. Analyze widely differing historical rulers and sources. Explore methods of analysis and interpretive strategies applicable to the images of modern rulers.

ARTH 162 HISTORY OF ARCHITECTURE 3
Survey of major buildings and settlement patterns as cultural expressions, ranging from antiquity to the present day. Lectures contextualize architectural and urban achievements in social, economic, political, religious and technological terms.

ARTH 163 ARCHITECTURE IN GLOBAL CONTEXTS 3
Concepts of architecture, with case studies drawn from various world regions ranging from prehistoric times to present. Understanding the role of architecture in human society and how it has shaped human history. Study of physical and cultural dimensions of architecture in different parts of the world and learn how to place their varieties in global contexts.

ARTH 166 SPECIAL PROBLEM 1-3

ARTH 198 STUDIES IN WORLD ART AND ARCHITECTURE 3
Monuments and artworks of the world, studied in a comparative and/or cross-cultural perspective. Topics highlight global cultural diversity in the history of art and architecture.
RESTRICTIONS: May be repeated for credit twice when topics vary.

ARTH 199 TOPICS IN ART HISTORY 3
An introduction to great artists and their masterpieces. Topics change with each time of offering. Specific topics may focus on a crucial moment in history, or on a particular theme explored throughout the ages.
RESTRICTIONS: May be repeated for credit twice when topics vary.

ARTH 201 INTRODUCTION TO MUSEUMS 3
Introduction to the history, operations and future of museums, historic sites, archives and related cultural organizations. Examines collecting and collection management, conservation of collections, exhibition development, public programs and museum education, and digital outreach. Museum careers and volunteer engagement are explored.
Croslisted with MSST203.

ARTH 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.
Croslisted with ENGL202. PREREQ: ENGL110.

ARTH 203 ART OF THE BLACK AND AFRICAN DIASPORA 3
Through the art and architecture of the Atlantic and Indian oceans, introduces the art of African Heritage peoples after the early 15th century and indicates what connects them (and what separates them) in terms of subject matter, style, representational mode and critique.
ARTH 204 ARCHITECTURE AND POWER IN AFRICA 3
Explores architecture in Africa as a representation both of political power and social/religious complexity. Architecture’s relationship to art forms a component of course content. Always regionally focused, lecture vary by semester among these five zones: West Africa and the Maghreb, the Sahel (West Africa and East Africa), East Africa and the Nile Valley, Southern Africa, and Central Africa. May be crosslisted with BAMS203.

ARTH 205 SCIENCE AND THE DETECTION OF ART FORGERIES 3
Concepts from many scientific disciplines are useful for interpreting works of art. Analytical techniques based on those concepts often reveal art forgeries. Case studies will use basic scientific principles to investigate a wide variety of known or alleged art forgeries.

ARTH 206 INTRODUCTION TO ART AND ARCHITECTURE IN AFRICA 3
Explores the history of the African continent from before Antiquity to the twentieth century, surveying a diversity of media including rock art, sculpture, painting and photography. Travels the vastness of Africa’s ethnic, historical and climatic richness in terms of African art and cultures, divinatory practices, histories of state formation, concepts of ancestry, colonialism, slavery, sensuality, revolution, and performance.

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

ARTH 208 GREEK AND ROMAN ART 3
Introduction to the art and architecture of ancient Greece and Italy. Emphasis on the means of art in political, religious, and social contexts in the cities of Athens, Rome, and Pompeii. Topics include the ancient Olympic Games, funerary monuments, and everyday life.

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

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

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

ARTH 217 RENAISSANCE ART IN A GLOBAL PERSPECTIVE: THE 1400s 3
Surveys the main artistic developments and cross-cultural exchanges in 15th- century European art and architecture. Topics include: the Search for Antiquity; Naturalism and Illusion; Guilds and Workshop; Humanism and the Arts; Public and Private Devotions; Courty Magnificence; the Peripatetic Artist; Looking East.

ARTH 218 RENAISSANCE ART IN A GLOBAL PERSPECTIVE: THE 1500s 3
Surveys the main artistic developments and cross-cultural exchanges in 16th- century European art. Topics include: the Splendors of Rome; the Crisis of the Image; Imitation and Competition; New Artistic Genres; The Genius of the Artist; Courtly Collectors; The Age of Discovery.

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

ARTH 220 ITALIAN RENAISSANCE ARCHITECTURE 3
Italian architecture and cities from 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 225 EIGHTEENTH CENTURY ART 3
Examines major trends and artists in 18th century European painting, sculpture and architecture in the framework of the social, ideological and cultural currents of the time. Artists such as Watteau, Hogarth, Blake, Chardin, Canova, David and Goya.

ARTH 227 MODERN ART: THE 19TH CENTURY 3
Art, architecture, and visual culture 1785-1900, including neoclassicism, romanticism, realism, Impressionism, and Symbolism, and topics such as the city, landscape, world’s fairs, colonialism, changing concepts of vision, new technologies and new mediums (prints, photography, posters, early cinema).

ARTH 228 MODERN ART SINCE 1900 3
Modern art from 1900 to the present considered globally and studied in its social and historical context, including painting, collage, sculpture, photography, performance, installation, institutional critique, and time-based media.

ARTH 229 CONTEMPORARY ART 3
Explores recent art and artists from around the world, investigating socio-historical forces and effects of contemporary modes of production, distribution, and consumption within the art market. New artistic practices like installation, new media, and performance are studied along with traditional media.

ARTH 230 MAKING AMERICAN ART 3
Painting, printmaking, architecture, sculpture, photography, and the decorative arts of North America from the earliest colonial settlements through the late nineteenth century. American art examined in the light of its political and social contexts, cultural diversity, and circulation through the Atlantic World.

ARTH 231 TWENTIETH-CENTURY AMERICAN ART 3
Twentieth-century arts of the United States, studied within transnational and global contexts. Surveys issues including the rise of modernism and postmodernism; cultural nationalism and the "usable past"; Abstract Expressionism, Pop, Minimalism, Conceptual Art, performance art, environmental art, and activist art.

ARTH 232 ART OF LATIN AMERICA 3
Survey of art and architecture in Latin America from pre-Hispanic times to the 21st century. Emphasis on the interaction between native traditions and imported ideas, particularly in relationship to religion, politics, and daily life.

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

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

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

ARTH 238 ISLAMIC ARCH OF AFRICA: CAIRO TO TIMBUKTU 3
A survey of architectural dialogues in and across the Sahara (North and West Africa) in the 9th through the 20th centuries. Includes introduction to philosophical texts and to Muslim travelers memories in relation to buildings as congregations of space and visual representation.
ARTH 239 ART AND ARCHITECTURE OF EUROPE 3-12
Primary focus on painting, sculpture and architecture in Europe from the Romanesque to the Modern eras. Subject matter determined by country in which overseas program is conducted.
RESTRICTIONS: Offered only in conjunction with a study abroad program. May be repeated for credit three times when topics vary.

ARTH 242 WOMAN AS IMAGE AND IMAGEMAKER 3
Analyzes the depictions of women in art from pre-history to the present in light of recent feminist studies. Topics correspond with particular periods in history. Each class includes a brief discussion of women artists and their works. May be crosslisted with WOMS242.

ARTH 243 DESIGN AND THE DECORATIVE ARTS 3
Introduction to the design histories and decorative arts of American and European cultures from the 18th century to the present. Examines the historical emergence of design styles (from Chippendale to modern) and forms (such as furniture, ceramics, and craft) while exploring histories of production, consumption, and circulation through global trade and cultural networks. Field trips to area museums may be required.
May be crosslisted with MCT243.

ARTH 244 AMERICAN ARCHITECTURE 3
Survey of American architecture from the colonial period to the present day. Lectures and assignments balance cultural themes with detailed discussion of masterworks of American architecture and urbanism.

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

ARTH 246 NO RESERVATIONS: NATIVE NORTH AMERICAN ART 3
From Tlingit dances set to hip hop music, to Chumash baskets shaped like teapots, this course will introduce students to dynamic, diverse, and ever-changing Native North American art. Examine artwork from the American Southwest to the Arctic across five centuries, focusing on the challenges that arise as objects, symbols, and ideas move between makers, cultures, and institutions over time.

ARTH 248 AFRICAN AMERICAN ART 3
Survey of the fine arts produced by people of African descent in the United States. Explores issues regarding identity and aesthetics with a focus on their negotiation of the art world given its history of racial exclusion.
PREREQ: ARTH230 or ARTH231 are highly recommended.

ARTH 249 ART AND ARCHITECTURE IN CONTEXT 3
Painting, sculpture and architecture studied as artistic and cultural expressions of their times.
RESTRICTIONS: Taught only in Study Abroad Program. May be repeated for credit three times when topic vary.

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

ARTH 298 GLOBAL MODERNISM 3
Surveys the twentieth-century development of modern architecture in various Western and non-Western countries around the world. Emphasis on the encounter of new materials and methods of construction with more traditional techniques, and the symbolic use of architecture to articulate political and cultural identities.

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

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.

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 303 ART OF THE IBERIAN WORLD, 1400-1800 3
The art of Spain and its New World territories from the 15th to the 18th centuries. Emphasis on the negotiation between different artistic and religious traditions in both the Iberian Peninsula (Christian, Muslim, and Jewish) and the Spanish and Portuguese colonies in the Americas (European, African and Native American). Topics vary. Examples: Art and Religion in the Iberian World; Art and Conquest in the Iberian World; Art of the Spanish Renaissance.
RESTRICTIONS: May be repeated for credit once when topics vary.

ARTH 304 NORTHERN BAROQUE ART: THE AGE OF RUBENS, REMBRANDT AND VERMEER 3
Painting, printmaking and art theory in 17th-century Holland and Flanders in social and historical context. Examines the rise of landscape, genre and portraiture, the nature of Dutch realism, the social role of the artist, art and theater, and the impact of religion on art.

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

ARTH 307 MONET TO PICASSO: ART IN FRANCE 1860-1910 3
Art and visual culture in France 1860-1910. Topics include impressionism, symbolism, the avant-garde, women artists, public art, bohemianism, exhibitions, colonialism, primitivism, mass culture, photography, and early cinema. Artists include Manet, Monet, Cezanne, Morisot, Seurat, Van Gogh, Gauguin, Vuillard, Bonnard, Rodin, Matisse, and Picasso.

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

ARTH 311 WOMEN, SOCIETY AND THE ARTS 3
Focuses on the role of women in art and society throughout the ages. Interdisciplinary and feminist readings emphasize a variety of approaches. Topics vary. Examples: Women in Antiquity, Renaissance Women, etc.
May be crosslisted with WOMS311. RESTRICTIONS: May be repeated for credit once when topics vary.

ARTH 314 SEMINAR: SHOPS AND SHOPPING 3
Historical overview of the spaces and practices of shopping in Europe and North America.

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.

ARTH 319 PHOTOGRAPHY IN THE UNITED STATES 3
Explores the cultural and scientific histories of photography in the United States beginning with introduction of daguerreotype in 1839. Topics include photography and portraiture, Civil War, western exploration, Pictorialism, and early modernism. Emphasizes study and identification of original photographic materials through introduction to historic photographic processes and materials, such as the ambrotype, tintype, stereograph, and Pictorialist techniques of negative and print manipulation.

ARTH 321 GREAT CITIES OF THE WORLD 3
Focus on a single city over time or in a specific historical moment. Looks at art, architecture and/or material culture. Topics vary. Examples: Nineteenth Century Paris; Ancient Pompeii; Florence under the Medici; Mexico City c. 1521.

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 325 SCULPTURE IN THE UNITED STATES 3
History of sculpture in the U.S. from the 18th century to the present. Lectures and discussion explore sculptural techniques and production; styles, iconographies, and functions; and cultural issues such as space, iconoclasm, and memory.

ARTH 334 CAIRO: ARCHITECTURE AND REVOLUTION 3
Course explores the history of Cairo from its founding to the present, paying attention especially to the nature and form of urban space in relation to architecture, as the background to and index of massive social change through time.

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

ARTH 366 INDEPENDENT STUDY 1-6
ARTH 399 TOPICS IN ART HISTORY 3
Detailed investigation in a lecture rather than a seminar format of varying topics, e.g., St. Denis and Problems of 12th Century Art.

ARTH 402 UNDERGRADUATE SEMINAR IN THE HISTORY OF ART 1-4
Emphasis on art historical reading and research. Student oral reports. Recent seminar topics include; Art and Religion in Latin America; Caravaggio; Art of the African Diaspora; Renaissance Rome. RESTRICTIONS: For undergraduates only. May be repeated for credit when topics vary.

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

ARTH 406 SEMINAR IN MEDIEVAL ART 3-12
The art of Europe from the fall of Rome to the late Gothic period. Recent topics include The Court of Charlemagne, Early Irish and Anglo-Saxon Art, and Saint Denis and the Origins of Gothic Architecture. PREREQ: ARTH209 or ARTH210 RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 408 ARTIST’S MACHINE 3
Exploration of artist-constructed machines (i.e. micro-electronics, robotics, kinetic sculpture and interactive installation) as media for artistic expression. Balance of theory and practice with specific emphasis on making of electronic objects and positioning these in various contexts. No prior knowledge of electronics required. Crosslisted with ART 406.

ARTH 413 SEMINAR IN RENAISSANCE ART & ARCHITECTURE 3
Renaissance art from 1300 to 1600. Recent topics include The Renaissance Villa and Art in the Age of Exploration. RESTRICTIONS: May be repeated for credit when topics vary.

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

ARTH 415 SEMINAR IN ITALIAN BAROQUE ART 3-12
Painting, sculpture and architecture in Italy in the 17th century. Recent topics include Bernini and Roman Baroque Sculpture, Seicento Poetics and Imagery, Caravaggio. RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 417 SEMINAR IN NORTHERN BAROQUE ART 3-12
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 419 SEMINAR IN ART OF THE IBERIAN WORLD, 1400-1800 3
Explore the arts of the Iberian Peninsula and the Spanish and Portuguese colonies from 1400-1800. Topics vary. Seminars may focus on particular artists, or on broader historical and/or methodological issues dealing with artistic production, reception, and circulation within the Spanish empire. RESTRICTIONS: May be repeated for credit once when topics vary.

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

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

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

ARTH 423 SEMINAR IN MODERN ART SINCE 1900 3
Aspects of the history, aesthetics, and theories of Modern Art from 1900 to the present. Topics may include the Avant-Garde, Abstract Art, Art and Politics, High vs. Low Art, and Folk and Outsider Art. PREREQ: ARTH227 or ARTH228 or permission of instructor. RESTRICTIONS: May be repeated for credit three times when topics vary.

ARTH 424 SEMINAR IN FILM 3
Aspects of the history and aesthetics of film since the invention of synchronized sound. Topics change with each time of offering. Topics may include Classic Hollywood Film, Gender and Film, Film Noir, Independent Film, Global Cinema. PREREQ: ARTH227 or ARTH318. RESTRICTIONS: May be repeated for credit three times when topics vary.

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

ARTH 427 SEMINAR IN THE HISTORY OF PHOTOGRAPHY 3
Aspects of the history and aesthetics of photography. Topics change with each time of offering. Topics may include Photography and Art, Documentary Photography, Photography and Criticism, Photography and Race, and Vernacular Photography. PREREQ: ARTH227 or ARTH228 or ARTH230 or ARTH231 or ARTH318. RESTRICTIONS: May be repeated for credit three times when topics vary.

ARTH 429 SEMINAR IN MODERN ARCHITECTURE 3-12
Architecture in Europe and/or America from 1750 to the present. Recent topics include the Architecture of Neoclassicism; and Sullivan, Wright and the Prairie School. RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 431 SEMINAR IN AMERICAN ART 3-12
American archtecture from the Colonies to the present. Recent topics include Architecture of the Colonial and Federal Periods, Nineteenth Century American Architecture, and Philadelphia Architecture. RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 435 SEMINAR IN AMERICAN ART 3-12
American art from the Colonies to the present. Recent topics include Art and Revolution in Early America; Early American Modernism, and American Painting and Sculpture after World War II. May be crosslisted with MCST435. RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 440 SEMINAR IN LATIN AMERICAN ART 3
The arts of Latin America from pre-Hispanic times to the 21st century. Topics change with each time of offering. Recent topics include Art and Religion in Latin America, and Art and Conquest in the New World. RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 445 SEMINAR IN EAST ASIAN ART AND ARCHITECTURE 3
Art, architecture and archaeology of China, Japan, and/or Korea. Materials from nearby regions may also be included. Possible topics include Chinese Art and Collecting, Modern Architecture in East Asia, Meiji Art and architecture, East Asian Archaeology and Nationalism.
ARTH 456  SEMINAR IN CONTEMPORARY ARCHITECTURE  3
Contemporary architecture from around the world. Topics include Contemporary Architecture, Cross-cultural Dialogues, Transnational Practices. Discover theories of postcolonialism and postmodernism to discuss aesthetic forms and concepts in the most recent architectural design projects.

ARTH 457  SURVEY OF AFRICAN ART  3
Major African art styles, their interrelationships, the context of usage and the meanings of African artworks. Crosslisted with ANTH457.

ARTH 464  INTERNSHIP IN ART HISTORY  1-3
On-the-job experience and explore potential occupational areas at a museum or other art related venue, under joint supervision of Department of Art History and sponsoring organization. Completion of journal of activities and/or final academic project or paper.
RESTRICTIONS: Requires pre-approval of instructor and/or department's Director of Undergraduate Studies. Does not count as a 400-level seminar and does not fulfill an area requirement. Does not count towards the 33 credits in Art History required to majors.

ARTH 466  INDEPENDENT STUDY  1-6

ARTH 480  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. Studio reconstructions of masterworks, lectures and library research. Crosslisted with ARTC480. RESTRICTIONS: Requires permission of instructor.

ARTH 488  STUDIO MATERIALS AND TECHNIQUES OF PAINTING I  3
Major masters and the materials, tools, supports and techniques of architectural painting and panel painting in tempera from about 1500 BC to AD 1500. Topics include true fresco and egg tempera painting. Studio reconstructions, lectures and library research. Crosslisted with ARTC488. RESTRICTIONS: Requires permission of instructor.

ARTH 489  STUDIO MATERIALS AND TECHNIQUES OF PAINTING II  3
Major masters and materials, tools and techniques of indirect and direct oil painting. Time frame: 1500 to present. Major topics include development of canvas, brushes, oil paint, mediums, varnishes, solvents and complex relationship between indirect and direct techniques. Includes studio reconstruction of masterworks, lectures and library research. Crosslisted with ARTC489. RESTRICTIONS: Requires permission of instructor.

ARTH 490  STUDIO IN THE MATERIALS AND TECHNIQUES OF PRINTMAKING I  3
Major masters and materials, tools and techniques of relief, planographic and intaglio printmaking. Time frame: ca. 1400-1920. Major topics include woodcut, copperplate engraving, etching, drypoint, aquatint, mezzotint, lithograph and wood engraving. Studio reconstructions, lectures and library research. Crosslisted with ARTC490. RESTRICTIONS: Requires permission of instructor.

ARTH 599  TOPICS IN ART HISTORY  3
Detailed investigation in a lecture rather than a seminar format of varying topics, e.g., St. Denis and Problems of 12th Century Art.

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

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

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

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

ARTH 613  STUDIES IN RENAISSANCE ART & ARCHITECTURE  3
Renaissance art and architecture from 1300 to 1600. Recent topics include Renaissance Villas and Gardens, Brunelleschi and Alberti, Roman Architecture in the Age of Michelangelo, and Palladio.
RESTRICTIONS: May be repeated for credit when topics vary.

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

ARTH 616  STUDIES IN ITALIAN BAROQUE ART  3
Italian art in the 17th century. Recent topics include Bernini and Roman Baroque Sculpture, Seicento Poetics and Imagery, Caravaggio.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 617  STUDIES IN NORTHERN BAROQUE ART  3
Seventeenth century art in northern Europe. Recent topics include Vermeer and Dutch Genre Painting; Art and Money; 17th Century Netherlands; and Prints of the Age of Rembrandt.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 619  STUDIES IN ART OF THE IBERIAN WORLD, 1400-1800  3
The arts of the Iberian Peninsula and the Spanish and Portuguese colonies from 1400-1800. Topics vary. Seminars may focus on particular artists, or on broader historical and/or methodological issues dealing with artistic production, reception, and circulation within the Spanish and Portuguese empires.
RESTRICTIONS: May be repeated for credit once when topics vary.

ARTH 620  SEMINAR IN AFRICAN ART  3
Topics vary from pre-Dagarian art (pre-European ‘discovery’) to 20th-century painting and contemporary African cinema and may include representations of Africa in Enlightenment art and philosophy, reviews of the literature on the arts of Fulani peoples and its related archive of documentary film.

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

ARTH 622  RESEARCH TOPICS IN HISTORIC PRESERVATION  3
Seminar addresses a specific research issue within historic preservation including hypothesis construction, design of research methodology and evaluation of results. Emphasis on use of primary sources and application of data-base techniques.
Crosslisted with UAPP636.

ARTH 623  STUDIES IN MODERN ART SINCE 1900  3
Aspects of the history, aesthetics and theories of Modern art from 1900 to the present. Topics may include the Avant-Garde, Abstract Art, Art and Politics, High vs. Low Art, and Folk and Outsider Art.
RESTRICTIONS: May be repeated for credit three times when topics vary.

ARTH 624  STUDIES IN FILM  3
Aspects of the history and aesthetics of film since the invention of synchronized sound. Topics change with each time of offering. Topics may include Classic Hollywood Film, Gender and Film, Film Noir, Independent Film, Global Cinema.
RESTRICTIONS: May be repeated for credit three times when topics vary.

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

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

ARTH 627  STUDIES IN THE HISTORY OF PHOTOGRAPHY  3
Aspects of the history and aesthetics of photography. Topics change with each time of offering. Topics may include Photography and Art, Documentary Photography, Photography and Criticism, Photography and Race, and Vernacular Photography.
RESTRICTIONS: May be repeated for credit three times when topics vary.
ARTH 629 STUDIES IN MODERN ARCHITECTURE 3
Architecture in Europe and/or America from 1750 to the present. Recent topics include the Architecture of Neoclassicism and Sullivan, Wright and the Prairie School.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 630 HISTORIOGRAPHY OF 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.
Crosslisted with HIST605. RESTRICTIONS: Requires permission of instructor.

ARTH 631 STUDIES IN AMERICAN ARCHITECTURE OF THE COLONIAL AND FEDERAL PERIODS 3
Architecture in the American Colonies from the anonymous buildings of the 17th century to the designs of Thomas Jefferson and B.H. Latrobe in the early 19th century.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 633 STUDIES IN NINETEENTH CENTURY AMERICAN ARCHITECTURE 3
The Greek, Gothic, Egyptian and Oriental Revivals; High Victorian Style and its culmination in the Age of Elegance; and Late Nineteenth Century Architecture.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 635 AMERICAN ART TO 1900 3
Seminar topics change with each offering. Recent topics include Sculpture in the US; Colonial Art across North America; Methods and Historiography in American Art; Art and Culture in Early Philadelphia: Peale to Eakins.
RESTRICTIONS: May be repeated twice for credit when topics vary.

ARTH 636 MODERN AMERICAN ART 3
Seminar in modern and/or contemporary American art, 1900-present. Topics vary by year; recent offerings have included Henry Ossawa Tanner, Norman Lewis, Fashion, and Ecology and Material Agency.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 640 SEMINAR IN LATIN AMERICAN ART 3
The arts of Latin America from pre-Hispanic times to the 21st century. Recent topics include Art and Conquest in the New World, and Life and Afterlife of pre-Hispanic Artifacts.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 654 VERNACULAR ARCHITECTURE 3
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.
Crosslisted with UAPP654.

ARTH 656 STUDIES IN CONTEMPORARY ARCHITECTURE 3
Contemporary architecture from around the world. Topics include Contemporary Architecture, Cross-cultural Dialogues, Transnational Practices. Discover theories of post-colonialism and postmodernism to discuss aesthetic forms and concepts in the most recent architectural design projects.

ARTH 657 SURVEY OF AFRICAN ART 3
Major African art styles, their interrelationships, the context of usage and the meanings of African artworks.
Crosslisted with ANTH657.

ARTH 664 INTERNSHIP IN ART HISTORY 3
Receive on-the-job experience and explore potential occupational areas at an art museum or other art-related venue, under joint supervision of the Department of Art History and sponsoring organization(s). Completion of journal of activities and/or final academic project or paper.
RESTRICTIONS: Requires approval of Director of Graduate Studies before registering the course. Does not count as a 600-level ARTH seminar and does not fulfill an area/distribution requirement.

ARTH 685 CULTURAL THEORY AND CRITICISM 3
Topical introduction to one or more cultural theories, providing a survey of scholarship on such varied topics as semiotics, deconstructionism, feminism, material culture, race, ethnicity studies, postcolonial and global studies, and problems of representation and signification in literary and non-literary texts.
Crosslisted with ENGL685. RESTRICTIONS: May be repeated once for credit when topics vary.

ARTH 688 STUDY MATERIALS AND TECHNIQUES OF PAINTING I 3
Major masters and materials, tools, supports and techniques of architectural and panel painting in tempera from about 1500 BC to AD 1500. Topics include true fresco and egg tempera painting. Studio reconstructions, lectures and library research.
Crosslisted with ARTC688. RESTRICTIONS: Requires permission of instructor.

ARTH 689 STUDIO MATERIALS AND TECHNIQUES OF PAINTING II 3
Major masters and materials, tools and techniques of indirect and direct oil painting. Time frame: 1500 to the present. Topics include development of canvas, brushes, oil paint, mediums, varnishes, solvents and complex relationships between indirect and direct techniques. Includes studio reconstruction of masterworks, lectures and library research.
Crosslisted with ARTC689. RESTRICTIONS: Requires permission of instructor.

ARTH 690 STUDIO IN THE MATERIALS AND TECHNIQUES OF PRINTMAKING 3
Major masters and materials, tools, and techniques of relief, planographic and intaglio printmaking. Time frame: ca. 1400-1920. Major topics include woodcut, copperplate engraving, etching, drypoint, aquatint, mezzotint, lithograph and wood engraving. Studio reconstructions, lectures and library research.
Crosslisted with ARTC690. RESTRICTIONS: Requires permission of instructor.

ARTH 851 SEMINAR IN ART HISTORICAL PEDAGOGY 3 PF
Discussion of all aspects of teaching in the field of art history (lectures, discussions, materials, examinations, grading), especially in the context of the teaching of a large introductory survey course.
RESTRICTIONS: Open only to teaching assistants in ARTH153 or ARTH154. May be taken for credit only once.

ARTH 860 READING AND RESEARCH 1-9 PF
Readings and conferences on an approved subject under faculty direction.
RESTRICTIONS: Requires permission of Department Chair. Open to Art History Ph.D. students only.

ARTH 869 MASTER’S THESIS 1-6

ARTH 870 MASTER’S PAPER 3
Research and writing of Master’s Paper.

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

ARTH 969 DOCTORAL DISSERTATION 1-12 PF

BLACK AMERICAN STUDIES

BAMS 107 HISTORY OF ROCK 3
The study of various styles of rock music. Introduction to folk, country, blues, and jazz as predecessors to rock. Intended for the non-music major. No music reading skills required.
Crosslisted with MUSC107.

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
Introduction to 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.
Crosslisted with HIST134.

BAMS 166 SPECIAL PROBLEM 1-3

BAMS 203 ARCHITECTURE AND POWER IN AFRICA 3
Explores architecture in Africa as a representation both of political power and social/religious complexity. Architecture’s relationship to art forms a component of course content. Always regionally focused, lecture vary by semester among these five zones: West Africa and the Maghreb, the Sahel (West Africa and East Africa), East Africa and the Nile Valley, Southern Africa, and Central Africa. Crosslisted with ARTH204.

BAMS 204 URBAN COMMUNITIES 3
Urbanization, rural-urban social differences and the organization of urban communities by race, class, ethnicity and stage in the life cycle.
Crosslisted with SOCI204.

BAMS 205 CONTEMPORARY AFRICAN AMERICAN ISSUES 3
The impact of important issues involving African American people in contemporary American society. Critical theoretical analyses of trends that affect programs of the Black community writ large.
BAMS 206 SURVEY OF AFRICAN AMERICAN CULTURE 3
Historic and contemporary aspects of African American culture. A multi-faceted approach utilizing resources from music, literature, history, folklore, religion and sociology.

BAMS 207 HISTORY OF JAZZ 3
Chronological study of the style changes in jazz from the late 19th century to the present. Emphasis on the sociological, economic and technological influences of the period and on the principal personalities who have been primarily responsible for change. Crosslisted with MUSC207. RESTRICTIONS: Offered in even numbered years, fall semester only.

BAMS 215 RACE IN SOCIETY 3
Examination of the social construction of race and its importance in institutions and social identify. History of race in the United States, including access to rights and privileges and how groups worked for racial equality. and how race structures relationships among diverse groups in society. Includes analysis of rights and privileges denied or extended to groups and how disadvantaged groups work towards racial equality. Crosslisted with SOCI215.

BAMS 220 THE CIVIL RIGHTS MOVEMENT 3-4
This course examines African American struggles for freedom, equality, and citizenship from the 1940s to the present. May be crosslisted with HIST220.

BAMS 293 SPECIAL TOPICS IN BAMS 1
Topics vary. RESTRICTIONS: May be repeated for credit when topics vary.

BAMS 296 HONORS FORUM 1
See ARSC296 for course description.

BAMS 298 RESEARCH ON RACE, ETHNICITY AND CULTURE 1 PF
Lecture series in which faculty and guest speakers discuss their research on contemporary and historical perspectives on race, ethnicity and culture. Research presented from several disciplines, including sociology, history, literature, anthropology and psychology, among others. Crosslisted with WOMS298. RESTRICTIONS: May be repeated for credit when topics vary.

BAMS 304 AFRICAN AMERICAN HISTORY TO THE CIVIL WAR 3
The history of African American life and culture to the Civil War. May be crosslisted with HIST325.

BAMS 305 RACE, IMAGE, IN MEDIA/CULTURE 3
Study how images shape and reflect attitudes toward race and ethnicity in culture. Visual materials include film, photography, television, and popular illustrations. May be crosslisted with HIST305.

BAMS 306 AFRICAN AMERICAN HISTORY SINCE THE CIVIL WAR 3
Provides an overview of the major themes, issues, and debates in African American History from the Civil War to the contemporary era. Through readings, lectures, discussions films, the course will address: the process of emancipation, Reconstruction, Jim Crow segregation and racial violence, black cultural production, the modern black freedom struggles, and black life in the 21st century. May be crosslisted with HIST326.

BAMS 307 BLACK THOUGHT AND PHILOSOPHY 3
Readings and discussions of Black philosophies, ideologies and concepts as reflected in the thought of significant Black figures. Crosslisted with PHIL307.

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

BAMS 309 POLITICAL CULTURE BY COUNTRY 3
Introduction to the political and civic cultures underpinning and supporting different political systems. Topics may vary depending on host country. Crosslisted with POSC309. RESTRICTIONS: Offered only in conjunction with travel abroad programs. May be taken twice for credit when countries vary.

BAMS 313 AFRICAN AMERICAN LITERATURE I 3
Literature by African American writers from the eighteenth century to the Harlem Renaissance. Crosslisted with ENGL344. PREREQ: ENGL110

BAMS 322 POLITICS AND THE AFRICAN-AMERICAN EXPERIENCE 3
Provides an insight and understanding of race as an intricate part of the political process in the United States. Role of race in United States politics is explored primarily through the political experiences of black Americans and how the political system has responded. Crosslisted with POSC322.

BAMS 324 THE ART OF SOCIAL CHANGE 3
20th Century international liberation artists’ works are examined from interdisciplinary perspectives. Students will observe and write about art works using behavioral science methods. Interaction with contemporary social change artists and one visual project are part of the course. Crosslisted with ART 324.

BAMS 326 THE AFRICAN DIASPORA AND THE WORLD 3
Focus on the historical, geographical, and cultural specificities of cultures in the African diaspora. Addresses the following main topics: history and geography of the African diaspora; slavery and responses to slavery (rebellions and revolutions); the ‘big thinkers’ of the African Diaspora, cultural manifestations (music and religion); discourses of whiteness, and ways to remember the Motherland. Crosslisted with ANTH326.

BAMS 327 RACE, GENDER, SCIENCE 3
Critically examines a number of metaphysical, epistemological, and ethical issues related to science of race, gender, and sexual orientation. Topics may include (a) evolution of sex and gender, (b) gender and cognition, (c) biological basis, or lack thereof, of sexual orientation/preference (d) evolutionary, cognitive, historical, and political origins of race thinking, (d) relationship between everyday conceptions of race and gender as compared with scientific conceptions of race and gender, (e) ethical issues raised by human kind classification schemes. Crosslisted with PFH327.

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

BAMS 331 HISTORY OF CARIBBEAN I 3
Examines major themes in Caribbean history from the pre-Columbian period to the end of slavery in 1838. Discussion of the demographic and ecological consequences of European contact, sugar and slavery, the evolution of Creole cultures and slave resistance. Crosslisted with HIST331.

BAMS 332 HISTORY OF CARIBBEAN II 3
Examines the period from 1838 to the present. Includes a discussion of the social and economic adjustments to emancipation, the making of plural societies with the importation of Asian laborers, American imperialism and political and social movements of the twentieth century. Crosslisted with HIST332.

BAMS 333 PEOPLES OF AFRICA 3
Social institutions and cultural traditions of Africa: political, economic, legal and kinship systems, and modes of thought. Crosslisted with ANTH333.

BAMS 334 AFRICAN AMERICAN WOMEN'S HISTORY 3
Explores the diversity of African American women's lives and development of women, work, and culture from the colonial era through the late 20th century. Examines the social, political, religious and economic factors affecting change and transformation in the lives of African American women. Provides a broad introduction to the interdisciplinary field of African American and Women's Studies. Crosslisted with HIST334.

BAMS 335 EXPERIENTIAL EDUCATION 3
Field experience combined with a seminar emphasizing professional issues in human services, including portfolio development and career planning. Students should arrange for a 50 hour field placement prior to first week of class (see instructor). Crosslisted with HDF5334. RESTRICTIONS: HMSV majors only or permission of instructor. Students planning to take HDF5334 must attend a course orientation prior to course enrollment (unless it is to be taken during as part of the Winter Session service-learning study abroad program).

BAMS 336 AMERICAN SLAVERY 3
In this class we will examine the institution of slavery from 1619 through the Civil War. This course has a number of goals, one of which is to examine the peculiar institution over space and time within colonial and antebellum America. Crosslisted with HIST335.

BAMS 345 AFRICAN AMERICAN LITERATURE II 3
Literature by African American writers from the Harlem Renaissance to the present. Crosslisted with ENGL345. PREREQ: ENGL110
BAMS 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. Crosslisted with ENGL347. RESTRICTIONS: May be taken up to three times when topics vary.

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

BAMS 351 RACE AND ETHNICITY IN LATIN AMERICA 3
Explores the multiple, complex and historically changing meanings of race and ethnicity in Latin America, and the consequences of discrimination towards specific groups. Regions covered are the Caribbean, Mexico and Central America, and the Andean, Atlantic and Southern Cone regions of South America. Crosslisted with ANTH351.

BAMS 352 BLACK FEMINIST THEORY 3
Explores black women and their struggles to define and re-define themselves in the US, from slavery to the modern era. Examines the historical evolution of black feminist theory starting with slave narratives and ends with contemporary readings. May be crosslisted with WOMS362.

BAMS 355 INEQUALITY, CRIME AND JUSTICE 3
Introduction to challenges in addressing crime in multiiracial, multietnic, class-stratified society. This context serves as backdrop for inquiry into crime causation, operations of the criminal justice system, and experiences of relevant actors. Crosslisted with CRJU355.

BAMS 356 STUDIES IN MODERN/CONTEMPORARY LITERATURE 3
Study of selected topics in 20th century British, American and world literature, e.g., the contemporary epic novel, post-colonial writing and politics. Crosslisted with ENGL356. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

BAMS 361 RACIAL INEQUALITY 3
A detailed examination of racial inequality, including the social construction of race, the nature of oppression and advantage, government policies and resistance strategies. There will be attention to the status of men and women and social class diversity within racial-ethnic communities. Crosslisted with SOC1361. PREREQ: SOC210.

BAMS 363 HISTORY OF BLACKS IN THE AMERICAN WEST 3
Examines the history of people of African descent in the western region of the United States from the Spanish colonial era to the present. Focus on contributions of men and women who shaped history of the region, of black America, and of the entire nation. RESTRICTIONS: Because one of the requirements for this course is a research paper, ENGL110 or previous experience with writing research papers with the use of citations is desired. Students should also have taken introductory courses in either American History or Black American History.

BAMS 364 THE AFRICAN DIALECTIS IN INDIA COUNTRY 3
Interdisciplinary exploration of the interactions between African Americans and Native Americans in the Americas (with a specific focus on the U.S.) from the colonial era to the present. Themes explored will be Transatlantic slavery and early Black-Indian continental contacts; American Indians as slaves and slave owners; the Black-Indian experience in the Jim Crow South and frontier West; Afro-Indian people and the politics of mixed-race identity, and contemporary African American and Native American relations in the U.S.

BAMS 369 SLAVE NARRATIVES IN THE AFRICAN DIASPORA 3
Examine the institution of slavery in the Americas through the perspective of the slaves who endured it. Letters, speeches, interviews and narratives will be examined within the historical context of 18th and 19th century slave society. The goal of the course is to 1) gain a deeper understanding of the slave experience from the slave's point of view, 2) examine the historical dimensions of slave testimony and its use as historical evidence, and 3) understand the gendered, regional, period and spatial nuances of the slave experience. May be crosslisted with ENGL369, HIS372.

BAMS 373 PSYCHOSOCIAL ELEMENTS OF HIP-HOP IN THE BLACK COMMUNITY 3
Critical look at evolution of Hip-Hop music and culture in the Black community. Focuses on how "street" elements of the Black community organized a socio-political and economic movement through their music.

BAMS 375 PEOPLES AND CULTURES OF MODERN LATIN AMERICA 3
Contemporary cultures and societies of Latin America, with emphasis on historical perspective. Rural and urban populations, the elite, the military, the church, students and workers. Crosslisted with ANTH375.

BAMS 381 UNDERSTANDING BLACK MEN IN THE STREETS AND IN PRISON 3
Examines development of a street identity in Black men in the community and criminal justice system, particularly as a result of inadequate economic and educational opportunity.

BAMS 382 STUDIES IN MULTICULTURAL LITERATURE IN ENGLISH 3
Consideration of multiculturalism as it pertains to American culture or literature in English from Africa and other non-European societies. Variable in historical range, geography, and genre. Crosslisted with ENGL382. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

BAMS 391 RESEARCH METHODS IN BLACK AMERICAN STUDIES 1-4
Develops methodology-based skills allowing for systematic thought and conduct of research on Black Americans in the African Diaspora.

BAMS 392 BRAZIL IN THE MODERN WORLD 3
Focuses on the social and political history of Brazil over five hundred years, from first indigenous contact with Europeans through independence, formation of the Republic, modernization and contemporary issues facing the country. Ends by examining Brazil's changing place on the global stage. Crosslisted with HIST392.

BAMS 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. Crosslisted with HIST395.

BAMS 397 HISTORY OF SOUTH AFRICA 3
Surveys the complex historical development of South African society. Topics include African resistance to white expansion, wars of resistance, the impact of agricultural and labor laws on African societies, tensions in white society, Africans in power since 1948, and African struggles for freedom. Crosslisted with HIST397.

BAMS 415 RACE, CLASS, AND GENDER 3
Analysis of current American social issues that show interrelationship of race, class and gender. Readings from sociology, Afro-American studies, feminist studies, history and literature. Crosslisted with SOC1415.

BAMS 416 PSYCHOLOGICAL PERSPECTIVES ON THE BLACK AMERICAN 3
Experience of Black Americans as viewed from a psychological perspective. Psychological theory and research pertaining to Black Americans; reactions to oppression, collective behavior, personality development, and life styles. Crosslisted with PSYC416. PREREQ: Grades of C- or better in PSYC207 and PSYC209. RESTRICTIONS: Open to junior and senior psychology majors and minors only.

BAMS 418 RACE, GENDER, AND POVERTY 3
An examination of contemporary American poverty with attention to race and gender as fundamental dimensions of inequality. Social policy, employment and family composition are key topics. Crosslisted with SOC1418. PREREQ: SOC210.

BAMS 420 RACE AND SEXUALITY 3
Examine sexuality as a structure of power and identity. Study how race is sexualized and sexuality is racialized. Explore the impact of binary thinking (white/non-white, straight/gay) on social relationships. The perspective of racial minorities, particularly African-Americans, is emphasized. Review research on culture, history, and policy. Crosslisted with SOC420. PREREQ: SOC210.

BAMS 431 RACE AND HEALTH 3
Examines the health status of socially disadvantaged racial and ethnic groups in the US. Attention will be focused on the patterned ways in which the health of these groups is embedded in the social, cultural, political, and economic contexts, and arrangements of US society. Crosslisted with SOC413.

BAMS 439 TOPICS IN AFRICAN POLITICS 3
Examination of selected topics in contemporary African politics. Topics will vary. Crosslisted with POSC439. RESTRICTIONS: May be taken twice for credit when topics vary.
BHAN 106 INTRODUCTION TO ANTHROPOLOGY OF HEALTH 3
Introduces biocultural anthropological approaches to health. It covers topics ranging from evolutionary perspectives on health, ethnomedical systems, disease vs. illness, alternative medicine, placebo and nocebo, diet and nutrition, growth and development, reproductive health, aging, infections and chronic disease, stress, mental health, social determinants and health disparities. Crosslisted with ANTH106.

BHAN 120 PHYSICAL EDUCATION 1-12 PF
Introduces knowledge and skills in physical activity. The program is geared toward lifetime sports and allows for selection.

BHAN 121 WATER SAFETY INSTRUCTOR 2
Prepares students with the skills and knowledge to teach people to swim and be safe in and around water. Topics covered: basic water safety, swimmer strokes, advanced lifesaving skills, first aid, artificial resuscitation, teaching techniques, lesson plans, unit plans and practical teaching experience.

BHAN 122 LIFEGUARD TRAINING 2
Skills and knowledge for the professional lifeguard. Topics include the professional lifeguard; rescue skills; breathing and cardiac emergencies; first aid; oxygen administration in the use of Automated External Defibrillation (AED); and spinal injuries.

BHAN 130 HEALTH TOPICS 1
Through a variety of relevant health topics students will examine how they can take responsibility for their health behaviors and live a healthier and more productive life.

BHAN 132 SCUBA 2
Prepares students with the skills and knowledge necessary to continue their training for open water scuba certification. May be crosslisted with MAST132.

BHAN 135 FRESHMAN SEMINAR 2
Covers basic survival skills: effective coping strategies to meet personal, academic, career and social challenges. Enhances student success and develops positive lifelong learning skills. RESTRICTIONS: Open to first semester freshmen.

BHAN 140 FUNDAMENTAL SKILLS ANALYSIS 3
Designed to develop cognitive understanding and practical experience for teaching and refinement of fundamental skills in grades K-12. Emphasis on processes of perceiving, extending, refining and applying fundamental skills through teaching progressions, lead-up games, and activities.

BHAN 141 ADVENTURE CHALLENGE AND OUTDOOR RECREATION 1
Provides opportunity to develop skills and techniques, learn methods and acquire knowledge of designated outdoor recreation skills and adventure challenge activities. Emphasis on developing readiness for presenting such activities in group settings. PREREQ: BHAN140.

BHAN 145 INTRODUCTION TO PHYSICAL EDUCATION 3
Focuses on curriculum and teaching methods for K-12 physical education. Examines student characteristics, domains of learning, movement concepts, planning and assessment to meet national and state content standards.

BHAN 155 PERSONAL HEALTH MANAGEMENT: AN APPROACH FOR A LIFETIME 3
Utilizing group problem solving techniques and on-line resources, students develop a comprehensive approach to managing their own health.

BHAN 160 HEALTH BEHAVIOR SCIENCE SEMINAR 1
Explore the multiple disciplines within the area of health behavior science through guest lectures by experts and student engagement in community health related activities.

BHAN 164 INCLUSIVE ACTIVITY SEMINAR 1
Examines ways to help people with disabilities remain physically active. Students assist an adult who has a disability one day per week with their existing exercise program. Adults are responsible for their own care and students simply assist them with their agreed upon exercise program.

BHAN 166 SPECIAL PROBLEM 1-3 PF

BHAN 168 FRESHMAN SPECIAL TOPICS 1-4
Freshman level independent study.

BHAN 202 YOGA: THEORY, RESEARCH AND PRACTICE 3
Investigation of the empirical research literature supporting yoga theory, practice, and philosophy, with an emphasis on health outcomes. Students will develop a personal yoga practice to promote health, self-awareness, and discovery. Students will also receive extensive training in yoga postures, breathing, and meditation.

BHAN 206 FARM TO TABLE 3
How does food get from the farm to your table? Explore traditional agriculture and contemporary food production models like Community Supported Agriculture (CSA), community gardens and the local food movement. Learn about new crops and dietary strategies that can be incorporated into the way people eat today. Examine cultural influences on food production and consumption patterns, and biocultural aspects of nutrition. Students will complete several projects that include interviews, research, food shopping excursions, film critiques and menu planning. Students will volunteer at the Delaware Food Bank and/or Gardens for the Community. Crosslisted with PLSC206.

BHAN 207 FOUNDATIONS OF LEISURE AND SPORT MANAGEMENT 3
History, theory, and philosophy of leisure and sport and their influence on society, with emphasis on principles and objectives of program planning and execution.
BHAN 225 **OFFICIATING RECREATIONAL SPORTS** 1-2
Theory and practice of officiating recreational sports. Introduced as a lifetime activity, emphasis is placed on practical experience with the intramural program. Minimal classroom time. Offers excellent leadership training.
RESTRICTIONS: Meets one half of a semester. Spring sports: basketball and softball.

BHAN 226 **SPORT, RECREATION AND LEISURE ABROAD** 3
Exploring the roles of sport, recreation and leisure in different international societies as part of a study abroad program. Includes opportunities to participate in and study popular sport, recreation, and leisure activities and may include visiting world class sporting events and facilities.

BHAN 230 **GROUP FACILITATION SKILLS IN HEALTH AND PHYSICAL EDUCATION** 3
Effective group facilitation, management and communication proficiency modeled and practiced. Participation in a variety of group models to enhance delivery of diverse classroom topics. Develops preliminary health education planning skills including communication of sensitive issues.
PREREQ: BHAN115.

BHAN 231 **TEACHING COMMUNITY AND MENTAL HEALTH** 3
Development of teaching approaches for mental health issues such as death and dying, suicide, depression, stress reduction and self-esteem. Emphasis on developing partnerships with community-based health programs and accessing pertinent health information.
PREREQ: BHAN115. RESTRICTIONS: Open to HPE majors only.

BHAN 236 **HEALTH AND PHYSICAL ACTIVITY ABROAD** 3
Examine the physical, social, environmental, and mental health benefits associated with a variety of activities common in, or unique to, the country of travel. Discussions will also focus on how culture, climate, and the environment influence these experiences.

BHAN 241 **TEACHING INDIVIDUAL SPORTS** 3
Designed to prepare physical education teacher candidates to teach a variety of individual sports that have been identified as relevant to national and state standards, and current K-12 physical education curricula. Emphasis on developing readiness for teaching these activities in public school setting.
RESTRICTIONS: HPE students only.

BHAN 245 **TEACHING TEAM SPORTS** 3
Designed to prepare physical education teacher candidates to teach a variety of team sports identified as relevant for K-12 physical education settings and both state and national standards. Emphasis placed on developing content and pedagogical knowledge necessary to teach these activities in public school settings.
RESTRICTIONS: HPE students only.

BHAN 251 **SKILLS, TECHNIQUES AND KNOWLEDGE OF RHYTHMS AND DANCE** 1
Preparation of physical education teachers. Provides opportunity to develop skills, learn methods and techniques and acquire knowledge of the above activities. Emphasis on developing readiness for presenting such activities in public school settings.
RESTRICTIONS: Open to HPEI and HPE majors only.

BHAN 261 **LEADERSHIP IN LEISURE AND SPORT MANAGEMENT** 3
Dynamics of group interaction and theories, principles, and practices of leadership. Review of research in leadership and group dynamics. Practical experience in applying theories and techniques through group execution of major campus-wide special event.

BHAN 263 **LEADERSHIP PRACTICUM** 1-3 PF
Students work under the auspices of an appointed professional to develop leadership skills in fitness activities.

BHAN 266 **SPECIAL PROBLEM** 1-3 PF

BHAN 268 **Sophomore Special Topics** 1-4
Sophomore level independent study.

BHAN 276 **TECHNOLOGY IN HEALTH AND PHYSICAL EDUCATION** 1
Focuses on future educators integrating technology into the classroom. Hands-on work involves designing educational experiences for professional and student use.
RESTRICTIONS: Open to HPE majors only.

BHAN 301 **THE ART OF HAPPINESS** 3
Designed to challenge students to examine how they can impact their happiness and improve their overall health and quality of life. Students will complete weekly assignments developed to address a variety of issues that impact happiness and quality of life.

BHAN 302 **MEDICAL ANTHROPOLOGY** 3
This course introduces the field of Medical Anthropology. It examines the interaction of biology and culture as it affects health and medical systems and focuses on: 1) cross cultural comparisons; 2) notion of adaptation in biocultural evolution; 3) understanding and appreciation of "exotic" ethnomedical systems; 4) critical cultural analysis of Biomedicine; 5) understanding issues of stigma, disability and the social process of health and illness; and 6) application of the concept of culture to practical problems in health delivery in a multicultural society.
Crosslisted with ANTH302.

BHAN 304 **CULTURE, HEALTH & ENVIRONMENT** 3
Human health and environmental health are intimately connected. Human behavior influences the health of the environment, which in turn influences human health. This course provides a biocultural perspective on culture, health, and environment, and their interactions. We will cover relationships between: 1) health and biodiversity, climate change, water, toxins, and energy; and 2) relationships between health and food, agriculture and dietary environment.
Crosslisted with ANTH304.

BHAN 307 **NUTRITIONAL ANTHROPOLOGY** 3
Nutritional Anthropology takes an explicit biocultural approach to nutrition, examining the interaction of biology and culture as they affect food systems, customs, practices and nutrition. Specific topics of the course include: evolutionary and comparative perspectives (biological baseline, agriculture, contemporary food systems); why we eat what we eat (materialist, symbolic explanations for foodways); adaptation of food to people and people to food; foods as medicines; under- and over-nutrition in contemporary world; child and infant feeding, hunger; solutions to diet-related problems.
Crosslisted with ANTH307.

BHAN 311 **ISSUES IN HEALTH BEHAVIOR SCIENCE** 3
Issues surrounding health behavior science, with emphasis on role of professional in promoting individual and community behavior change.
RESTRICTIONS: Open to HLBH majors only.

BHAN 315 **INSTRUCTIONAL STRATEGIES FOR DRUG EDUCATION** 3
Presents methods and materials to be used in school drug education programs. Emphasis on basic information related to the drug problem. Outside resource people including former drug users will be involved in class presentations.
PREREQ: BHAN115 and BHAN230.

BHAN 319 **HEALTH RELATED FITNESS** 3
Provides knowledge/techniques for teaching K-12 students to incorporate daily physical activity and nutrition into their personal wellness plans. Emphasis on health-related fitness, lifetime physical activity and nutrition using a nationally approved program.
RESTRICTIONS: Open to Health and Physical Education majors only.

BHAN 322 **INTERNATIONAL COMMUNITY HEALTH** 3
Examines how culture, environment, economics, and knowledge impacts community health. Students will visit health agencies while abroad and engage in service learning at a local agency addressing the needs of an underserved population.

BHAN 324 **MEASUREMENT AND EVALUATION** 3
Measurement and evaluation of physical skills and knowledge as related to physical education. Includes descriptive statistics, knowledge tests, grading, physical performance tests and tests of sports skills.
PREREQ: Three-credit math course RESTRICTIONS: Open to HPE majors only.

BHAN 325 **INSTRUCTIONAL STRATEGIES FOR HUMAN SEXUALITY** 3
Develops content knowledge and presents teaching methodologies relative to all facets of human sexuality. Emphasis on the process of integrating information into effective age specific educational strategies.
PREREQ: BHAN315. RESTRICTIONS: HPE majors or permission of instructor.

BHAN 326 **RESEARCH METHODS AND STATISTICS FOR BEHAVIORAL SCIENCE** 3
Overview of research methods and statistical analyses commonly used in health behavior science. Emphasis is placed on learning the techniques and application of appropriate statistical techniques using Statistical Package for the Social Sciences (SPSS) software as applied to Health Behavior Science.
RESTRICTIONS: Open to juniors and seniors in health behavior science major only.
BHAN 329 DYNAMICS OF TEAM PROBLEM SOLVING 3
Development of teaming skills and their application in solving real life health-related issues. Topics include facilitation and leadership, dialogue and discussion, team maintenance and development and conflict resolution.

BHAN 332 HEALTH BEHAVIOR THEORY AND MODELS 3
Provides understanding and application of health behavior theory and models to behavior change and health program development and evaluation. Emphasizes skills and competencies necessary for utilizing health behavior theories and models in developing health promotion programs at individual and community levels.

RESTRICTIONS: Open to students in health behavior science and the following minors: Public Health, Health, Physical Activity and Disability; Health and Wellness.

BHAN 333 HEALTH BEHAVIOR THEORY AND PROGRAM PLANNING 3
Health behavior theories as they relate to youth health behaviors and development of health education programs, including development and use of instruments for assessing health behaviors.

RESTRICTIONS: Open only to HPE majors.

BHAN 334 HEALTH BEHAVIOR ASSESSMENT 3
Skill development using qualitative and quantitative assessments in health behavior. Methods include focus groups, interviews, questionnaire development, and quantitative assessment of local, state and national level health data bases.

COREQ: BHAN326, BHAN332. RESTRICTIONS: This course is restricted to HBS majors only.

BHAN 335 HEALTH AND AGING 3
Aging process addressed from biopsychosocial perspective. Particular emphasis placed on developing understanding of complex interrelationships among aging, health and social structure.

RESTRICTIONS: Open to health behavior science or GRN concentration majors only.

BHAN 341 PRINCIPLES OF OUTDOOR RECREATION 3
Presents an orientation to the field of outdoor recreation. Attention given to heritage, trends, resources, economics, management approaches, ecological and educational goals and ethics toward an outdoor natural environment. Laboratory section involves participation and skill development in a variety of outdoor recreation activities.

BHAN 342 INTRODUCTION TO ADAPTED PHYSICAL ACTIVITY 3
Current concepts and trends in adapted physical activity across the lifespan, including skills necessary to prepare meaningful individualized movement experiences for people with special needs. Field work required.

RESTRICTIONS: Open to the following majors: APN, ATI, DIET, EXSC, HLBH, HLST, HPE, NS, and the following minors: HPAD and DIST.

BHAN 343 ADAPTED PHYSICAL EDUCATION 3
Knowledge and skills required to meet the professional and legal mandates pertaining to individualized health and physical education for students with special needs.

PREREQ: KAAP220, KAAP301. RESTRICTIONS: Restricted to HPE majors with junior or senior standing.

BHAN 345 TACTICAL APPROACH TO TEACHING SPORTS 3
Uses tactical problems to teach invasion, wall/net and fielding/run-scoring activities. Students analyze strategies for successful transfer across similar games. Appropriate practices and outcomes of quality physical education programs emphasized.

PREREQ: BHAN140. RESTRICTIONS: Open to HPE majors only.

BHAN 351 THE MODERN OLYMPIC GAMES 3
Examine the social, economic, and political impact of The Modern Olympic Games through exploration of how this international event influences health behaviors and activity levels of people including those with a disability around the world.

BHAN 366 INDEPENDENT STUDY 1-6 PF

BHAN 368 JUNIOR SPECIAL TOPICS 1-4
Junior level independent study.

BHAN 371 OUTDOOR ADVENTURE LEADERSHIP 3
Introduces recreation leadership in outdoor adventure activities. Attention directed toward conceptual and technical aspects of adventure programs.

BHAN 390 PRINCIPLES OF COACHING 3
Introduces students to the general philosophy and methods of coaching. Covers communication skills, teaching skills, sport psychology and managing team related responsibilities and relationships, including risk management.

PREREQ: KAAP330. RESTRICTIONS: Open to coaching science minors only.

BHAN 401 FOUNDATIONS OF HUMAN SEXUALITY 3
A multidisciplinary study of human sexuality focusing on the implications for individuals and society of the biological, psychological and sociocultural determinants of human sexuality. Deals with sexually explicit material.

Crosslisted with HDFS401.

BHAN 403 PRACTICUM IN ADAPTED PHYSICAL ACTIVITY 1-6 PF
Supervised learning experiences in designing, implementing, and evaluating appropriate physical activity programs and interventions for individuals with special needs participating in a variety of clinical settings (e.g., schools, community centers, private clubs, camps, sport leagues, institutions, clinics, or group homes).

RESTRICTIONS: Permission of the instructor.

BHAN 414 METHODS AND MATERIALS IN HEALTH EDUCATION 3
Emphasis on health education in school curriculum: curriculum content and organization of materials for instructional purposes.

PREREQ: BHAN355, KAAP210, BHAN321, BHAN315 and BHAN335. Satisfactory completion of Praxis I. RESTRICTIONS: Junior status, upper division clearance, minimum gpa of 2.50, major index of 2.75 and completion of all skills requirements. Open to HPE majors only.

BHAN 416 METHODS / MATERIALS PHYSICAL EDUCATION 3
This is a culminating course that is the pre-cursor to the student teaching capstone experience. Extensive time will be spent teaching in the K-12 setting with emphasis on designing and delivering developmentally appropriate units of instruction and pedagogical analysis of effective teaching behaviors.

PREREQ: All BHAN courses listed in the program of study except for 415 and 465 and EDUC 420 and satisfactory completion of Praxis I. RESTRICTIONS: Approval from HPE program chair.

BHAN 422 ORGANIZATION AND ADMINISTRATION OF LEISURE SERVICES 3
Study of operation and management of sport, recreation and fitness facilities. Emphasis placed on developing skills necessary to conduct day-to-day operations and manage these types of facilities.

RESTRICTIONS: Open to senior health behavior science majors.

BHAN 432 EXERCISE TESTING AND PRESCRIPTION 4
Basic exercise prescription and fitness testing, including considerations for populations with special needs. Provides background content for American College of Sports Medicine's Health Fitness Instructor exam.

PREREQ: KAAP220 or KAAP310 or BISC276, and KAAP430 or KAAP433. RESTRICTIONS: Open only to majors in HNES, or those with health exercise or youth management concentrations.

BHAN 435 PHYSICAL ACTIVITY BEHAVIOR 3
Introduction to behavioral and psychological aspects of physical activity participation with emphasis on determinants of physical activity patterns across the lifespan and the psychosocial antecedents and consequences of physical activity participation.

PREREQ: KAAP220 or KAAP309.

BHAN 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, hypnotic stress reduction and concentration techniques.

BHAN 445 HEALTH, PHYSICAL ACTIVITY, & DISABILITY 3
Advanced study and implementation of individualized physical activities for people with various disabilities in a variety of settings that promote health and wellness. Development of professional, advocacy, and leadership skills will be emphasized.

PREREQ: BHAN342 or BHAN343. RESTRICTIONS: Restricted to students with junior or senior standing.

BHAN 460 COACHING/PERFORMANCE PRACTICUM 3 PF
Practical coaching/performance experience in a scholastic/clinical setting with the season chosen corresponding to each student's interest. The student must keep a daily log of methods and experiences and choose an appropriate project. Observations will be made by the minor coordinator and the cooperating supervisor.

PREREQ: KAAP210, KAAP220, KAAP320, and BHAN390. RESTRICTIONS: Students must have Junior/Senior status and be accepted into the Coaching Science Minor.

BHAN 464 INTERNSHIP 4-9 PF
Practical learning experiences in fitness, sport and/or leisure service management. Working in a content area related setting, students complete a pre-determined number of hours with faculty advisement throughout the semester.

RESTRICTIONS: Requires permission of instructor.
BINF 465  **TEACHING SEMINAR IN HEALTH AND PHYSICAL EDUCATION**  2
Examines the role of the health and physical education teacher in the elementary and secondary schools. Provides a forum for analyzing and discussing topics of interest to preprofessionals and includes participation of professionals from the school community.
PREREQ: BHNAN414. COREQ: EDUC400  RESTRICTIONS: Open to HPE majors only.

BINF 466  **INDEPENDENT STUDY**  1-6  PF

BINF 468  **SENIOR SPECIAL TOPICS**  1-4
Senior level independent study.

BINF 490  **DEVELOPMENT OF HEALTH PROMOTION PROGRAMS**  3
Prepares students to plan, create and implement health promotion programs in the workplace, focusing on program selection, promotion, evaluation and expansion.
PREREQ: BHNAN332 and BHNAN326 or STAT200.  RESTRICTIONS: Open to HBM and HLHB majors, students in the public health minor, and GRN concentrations.

BINF 609  **SURVEY RESEARCH METHODS**  3
Emphasis on procedures for designing survey-based research studies, including choice of subjects, development of proper instrumentation, statistical design and analysis, and formulation of proposals appropriate for publication.
RESTRICTIONS: Restricted to students in the M.S. programs in health promotion and human nutrition.

BINF 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.

BINF 666  **SPECIAL PROBLEM**  1-12

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**Bioinformatics**

BINF 566  **SPECIAL PROBLEM**  1-6

BINF 640  **DATABASES FOR BIOINFORMATICS**  3
Covers three major topics in the creation of a bioinformatics database application.

BINF 644  **BIOINFORMATICS**  3
Couples lectures and hands-on exercises to introduce the basic concepts and approaches of bioinformatics. The objectives are: (i) to introduce bioinformatics concepts, vocabularies, and basic algorithms, (ii) to familiarize with various bioinformatics tools, databases and resources, and (iii) to provide an understanding of web-accessible bioinformatics applications.

BINF 650  **PROTEIN MODIFICATIONS**  3
Presents a survey of protein modifications, how to detect them and determine their structure using mass-spectrometry, diffraction, and NMR with an emphasis on proteomic and bioinformatic approaches. An overview will consider how modifications arise and evolve, their roles in metabolism and disease, and methods for predicting them.

BINF 666  **SPECIAL PROBLEM**  1-12

BINF 684  **INTRODUCTION TO MACHINE LEARNING**  3
Development of methods to learn to solve a task using examples. Explore different machine learning algorithms/techniques and discuss their strengths and weaknesses and situations they are or are not suited for.
Crosslisted with CISC684.  PREREQ: Basic background in probability and statistics.
RESTRICTIONS: Credit cannot be received for both CISC484 and CISC684.

BINF 689  **TOPICS: ARTIFICIAL INTELLIGENCE**  3-12
Contents vary to coincide with the interests of students and faculty. May be crosslisted with CISC689.  PREREQ: CISC681  RESTRICTIONS: Credit cannot be received for both CISC689 and CISC489.

BINF 694  **SYSTEMS BIOLOGY I**  3
This course couples lectures and hands-on exercises to introduce students to experimental methods and bioinformatics analysis in systems biology, showing how global analysis of omics data improves understanding of biological systems. This course has three units: (i) experimental techniques; (ii) genomics and transcriptomics data analysis; and (iii) proteomics and pathway/network data analysis.

BINF 695  **COMPUTATIONAL SYSTEM BIOLOGY**  3
Computational/mathematical techniques for modeling & analysis of biological systems. Includes properties of gene-regulatory and signaling networks; network reconstruction from data; stochastic modeling to study cellular variation & physiological modeling.
May be crosslisted with BMEG695, ELEG697.

BINF 815  **ETHICS, BUSINESS AND COMMUNICATION**  3
Provides professional development in ethics, business and communication related to systems biology research applications in stem cell, tissue engineering, and drug delivery technologies. Intended for PhD students in interdisciplinary life science and engineering programs.
May be crosslisted with BISC815, BMEG815, CHEG815, CHEM815, ENTR815, MAST812, MSEG815, PHIL815.

BINF 816  **SYSTEMS BIOLOGY OF CELLS IN ENGINEered ENVIRONMENTS**  3
Provides a technical review of systems biology approaches including genomics, transcriptomics, proteomics, metabolomics, and bioinformatics as well as applications in tissue engineering, stem cell differentiation, and drug delivery. Intended for PhD students in interdisciplinary life science and engineering programs.
May be crosslisted with BISC816, BMEG816, CHEG816, CHEM816, ELEG806, MAST813, MSEG816.

BINF 864  **INTERNSHIP**  1-6
Supervised, on-the-job experience on specialized topics in bioinformatics or industry research and analysis related to bioinformatics. Topics range from bioinformatics method, tool and database development to application of bioinformatics approaches to biotechnology and medicine. Industry research and analysis include topics on product development, project or operations management, and ethical, legal and regulatory affairs.

BINF 865  **SEMINAR**  1
Lectures and discussions by guest speakers, faculty, and students on specialized topics and cutting-edge developments in bioinformatics and computational biology.

BINF 866  **SPECIAL PROBLEM**  1-12

BINF 868  **RESEARCH**  1-6

BINF 869  **MASTER’S THESIS**  1-6
Independent research leading to the Master's Thesis.

BINF 964  **PRE-CANDIDACY STUDY**  3-12  PF

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

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**Biological Sciences**

BISC 100  **FRESHMAN SEMINAR**  1  PF
Provides a forum for the discussion of topics in biology that relate to material being covered in BISC207. Papers from the scientific literature and/or world wide web may be discussed.
RESTRICTIONS: Open to freshman majors by faculty invitation only.

BISC 103  **PRINCIPLES OF BIOLOGY**  3
The study of biological principles at multiple levels of organization. Fosters biological literacy through the exploration of concepts, theories, practices, and new developments and their impact on individuals and society.
RESTRICTIONS: Open to non-majors only. Students may not receive credit for both BISC103 and BISC104. Students may not receive credit for BISC103 if taken after successful completion (C- or better) of BISC205, BISC207 or BISC208. Non-majors may take only one of BISC103,
BISC 104 PRINCIPLES OF BIOLOGY WITH LABORATORY 4
The study of biological principles at multiple levels of organization. Fosters biological literacy through the exploration of concepts, theories, practices and new developments and their impact on individuals and society. The laboratory component provides concrete examples of some of the principles discussed in the lecture component.
RESTRICTIONS: Open to non-majors only. Students cannot receive credit for both BISC103 and BISC104. Students may not receive credit for BISC104 if taken after successful completion (C- or better) of BISC205, BISC207 or BISC208. Non-majors may take only one of BISC103, BISC104, or BISC107.
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. Students may not receive credit for BISC 106 if taken after successful completion (C- or better) of BISC276 or BISC306.
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
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 RESTRICTIONS: Offered only on Associate in Arts Program campuses.
BISC 115 HUMAN HEREDITY AND DEVELOPMENT LABORATORY 1
Laboratory exercises dealing with probability, selection, karyotyping and pedigrees of humans.
COREQ: BISC105 RESTRICTIONS: Offered only on Associate in Arts Program campuses.
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. RESTRICTIONS: Offered only on Associate in Arts Program campuses.
BISC 117 ELEMENTARY EVOLUTIONARY ECOLOGY LABORATORY 1
Laboratory exercises to compliment the subject matter of BISC107.
COREQ: BISC107 RESTRICTIONS: Open to non-majors only. Offered only on Associate in Arts Program campuses.
BISC 127 ENVIRONMENTS AND CULTURES IN CONFLICT 4
Examines how individual cultures and advances in technology have impacted our environment. Potential solutions for resolving conflicts are developed by the students and presented in class. Relationships between human cultures, technology, and environmental degradation are stressed.
RESTRICTIONS: Open to non-majors only.
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 317  TROPICAL ECOLOGY  3
Basic aspects of tropical ecology including climatic, geological and adaptive components. Focuses on species’ interactions and ecosystems. Includes at least two field trips.  
PREREQ: BISC208.  RESTRICTIONS: Taught in Costa Rica.

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

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

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

BISC 366  INDEPENDENT STUDY  1-6

BISC 400  SPECIAL TOPICS IN BIOLOGY  1
Exploration of special topics in biological sciences at a level appropriate for junior and senior biological sciences majors. Subject matter taught will vary depending on instructor and semester.  
PREREQ: BISC208.  RESTRICTIONS: May be repeated for credit when topics vary.

BISC 401  MOLECULAR BIOLOGY OF THE CELL  3
Introduction to the molecular biology of eucaryotes and procaroytes. 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 or BISC205 and one semester of organic chemistry.

BISC 403  GENETICS  3
The physical and chemical basis of heredity, the nature and mechanisms of gene action.  
PREREQ: BISC207 or BISC205 and one semester of organic chemistry.

BISC 408  MICROSCOPIC ANATOMY  4
Microscopic organization, identification and functional anatomy of mammalian organ systems and tissues.  
PREREQ: BISC208.

BISC 411  EXPERIMENTAL MOLECULAR BIOLOGY  4
Introduction to the process of scientific inquiry as it relates to cellular molecular biology. Learn the theory behind experimental procedures in the field and perform a series of laboratory exercises emphasizing experimental design and data analysis. Pose related scientific questions, design experiments and present results in written, poster or oral format.  
PREREQ: BISC208, BISC401, CHEM321 or CHEM213.

BISC 413  ADVANCED GENETICS LABORATORY  4
Students conduct laboratory investigations in Mendelian genetics, population and evolutionary genetics, and molecular genetics; learn to use several common bioinformatics tools; and design, perform and analyze original experiments.  
PREREQ: BISC208, BISC403.

BISC 415  DEVELOPMENTAL BIOLOGY  3
Explore mechanisms underlying development. Topics: gamete interactions, establishment of body plans, cell signaling and tissue interactions, morphogenetic pattern formation, developmental regulation of gene expression, molecular control of tissue specification and diversification, and the evolutionary comparison of developmental processes. Diseases resulting from developmental defects will be discussed. May be crosslisted with ANFS415.  
PREREQ: BISC208 and BISC208.

BISC 422  TEACHING EXPERIENCE  1-2
Teaching experience in an undergraduate laboratory. Evaluation based on teaching performance and preparation of required material for laboratory.  
RESTRICTIONS: Prior completion of core requirements necessary. Requires permission of instructor.

BISC 435  POPULATION ECOLOGY  3
Understand population processes by combining a discussion of theory and practical applications. Includes exponential, logistic, and age-specific growth as well as predation, competition, disease, and metapopulations. Model-building exercises actively used to understand theoretical dynamics.  
Crosslisted with ENWC435.  
PREREQ: BISC302.

BISC 439  DEVELOPMENTAL NEUROBIOLOGY  3
Developmental biology of the nervous system, including cellular components, neural induction, neurogenesis and neuronal migration, cellular determination, axon outgrowth and pathfinding, synapse formation, programmed cell death, neurotrophic factors, neurodevelopmental disorders, and early critical periods.  
PREREQ: BISC208.  RESTRICTION: Suggested prerequisite is BISC305 or BISC401.

BISC 440  CONSERVATION OF TROPICAL BIODIVERSITY  3
A 3-week intensive, field-based experience in the mechanics of conserving tropical biodiversity. Focuses on group projects quantifying and comparing the diversity of montane cloud forests, lowland rainforests and tropical dry forests. Crosslisted with ENWC444.  RESTRICTIONS: Winter or Summer Session only. Taught in Costa Rica or Peru.

BISC 442  VERTEBRATE MORPHOLOGY  4
The vocabulary describing vertebrate anatomy is introduced and discussed by tracing the evolutionary and developmental histories of major vertebrate organ systems. Laboratory involves detailed dissections of representative vertebrates.  
PREREQ: BISC208

BISC 451  UNDERGRADUATE THESIS I  3
Independent research under direction of faculty member.  
PREREQ: Admission to B.S. in Biology in either CMG or EOB concentration.  
RESTRICTIONS: Not for students pursuing degree with distinction.

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

BISC 466  INDEPENDENT STUDY  1-6

BISC 468  RESEARCH  1-6

BISC 471  INTRODUCTORY IMMUNOLOGY  3
The biological basis of adaptive immunity including participating cells, cellular interactions, counted mechanisms and immunopathologies.  
PREREQ: BISC305 or BISC306 or BISC401.

BISC 475  CARDIOVASCULAR BIOLOGY  3
Basic physiology of the human cardiovascular system, basis of cardiovascular diseases and current treatments. Focuses on heart failure, hypertension, atherosclerosis, thrombosis and leukemia.

BISC 480  VERTEBRATE NATURAL HISTORY  3
Biology of vertebrate organisms dealing specifically with adaptations to the environment, morphology, physiology and taxonomy.  
PREREQ: BISC208

BISC 484  COMPUTER BASED GENETICS LABORATORY  3
Explore the use of genome databases and the tools of bioinformatics, then and apply those skills to design and carry out wet lab experiments, which will involve the isolation and manipulation of DNA and RNA from human and animal subjects.  
PREREQ: BISC401 or BISC403.

BISC 492  HUMAN MOLECULAR CYTOGENETICS  3
Introduction to the molecular and genetic organization, function, and behavior of eukaryotic chromosomes, with special emphasis on humans. Covers various state-of-art techniques that are used in the preparation and analysis of mammalian chromosomes, the contribution of chromosome studies to our understanding of the mechanisms of gene regulation, and medical cytogenetics.  
PREREQ: BISC208.  RESTRICTIONS: BISC403 recommended in addition to prerequisite. Offered in spring of odd-numbered years.

BISC 495  EVOLUTION  3
Present status of the theory of biological evolution and its implications in the different areas of biology.  
PREREQ: BISC208

BISC 498  TOPICS IN BIOLOGY  3-6
Topics may vary from section to section. Information about each section is available in the Biology Office prior to registration.  
PREREQ: BISC208 (or two BISC100-level courses).  
RESTRICTIONS: Requires junior or senior status. May be taken more than once but only three credits can count towards the major.

BISC 510  TOPICS IN MIDDLE SCHOOL BIOLOGY EDUCATION: GENETICS  3
Strengthens the content understanding of the developmentally appropriate genetic concepts for middle school students. Instructors model effective inquiry-based classroom pedagogy and teachers engage in reflective discussions of how to enhance student appreciation of genetics.  
RESTRICTIONS: Enrollment limited to in-service high school science educators.
BISC 530  TOPICS IN BIOLOGY EDUCATION: NATURE OF SCIENCE AND EVOLUTION  3
Strengthens understanding in key areas of evolutionary biology and the nature of science, using methods that model inquiry-based classroom practices. Discussions focus on best ways to enhance student understanding, and on dealing with controversies in the teaching of evolution in high school.
RESTRICTIONS: Enrollment limited to in-service high school science educators.

BISC 600  BIOTECHNOLOGY AND MOLECULAR MEDICINE  3
Application of molecular and cellular biology techniques and principles to the field of biotechnology. Stresses the applied side of science and focuses on the practical side of molecular biology and how scientists and companies reduce the basic knowledge to practice. Emphasis on product formation and the skills required to meet such goals. Covers tangential issues of biotechnology and the ethical choices made in developing clinical trial protocols.
PREREQ: Undergraduate course in biology or chemistry or permission of the instructor.

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

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

BISC 603  INTRODUCTION TO LABORATORY INSTRUCTION  1 PF
Inservice required of first-year graduate teaching assistants. Prepares teaching assistants to become effective instructors. Topics relate to the theory and practice of teaching in a laboratory setting. Crosslisted with CHEM601. COREQ: Having a chemistry (or another science) teaching assistantship.

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

BISC 605  ADVANCED MAMMALIAN PHYSIOLOGY  4
Systemic mammalian physiology: cellular mechanisms, muscle, cardiovascular, respiratory, renal, digestive and endocrine systems. Emphasizes human physiology and includes discussions of primary literature in the field of physiology research. May be crosslisted with KAAP615.
PREREQ: BISC306 or instructor's approval.
RESTRICTIONS: Priority given to graduate students and seniors seeking research-related careers.

BISC 606  ADVANCED MAMMALIAN PHYSIOLOGY II  4
Continuation of BISC605. Systemic mammalian physiology: respiratory, renal, gastrointestinal, endocrine systems and metabolism.
May be crosslisted with KAAP616.
PREREQ: BISC605.

BISC 609  MOLECULAR BIOLOGY OF THE CELL  3
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.
RESTRICTIONS: Graduate students only. Does not count for major credit for graduate students in Biological Sciences.

BISC 610  ENDOCRINE PHYSIOLOGY  3
Focus on how hormones produced by endocrine glands regulate physiological functions. Endocrine glands include pancreas, thyroid, adrenal, pituitary and reproductive organs, which produce hormones affecting reproduction, metabolism, growth and development. Endocrine dysfunction underlies disorders such as diabetes, cancer, stress, obesity, osteoporosis, and infertility.
PREREQ: BISC305, BISC306.
RESTRICTIONS: Permission of the instructor.

BISC 612  ADVANCED CELL BIOLOGY  3
Four major sections: (1) cell structure/function; (2) signalining mechanisms and cell fate; (3) protein biosynthesis and trafficking and (4) integrative cell biology. Requires interpreting and evaluating data from primary scientific literature.
PREREQ: BISC305, BISC401 and either BISC306 or BISC408.
RESTRICTIONS: Meets literature requirement for biology majors.

BISC 615  DEVELOPMENTAL BIOLOGY  3
Explore mechanisms underlying development. Topics: gamete interactions, establishment of body plans, cell signaling and tissue interactions, morphogenetic pattern formation, developmental regulation of gene expression, molecular control of tissue specification and diversification, and the evolutionary comparison of developmental processes. Diseases resulting from developmental defects will be discussed.
May be crosslisted with ANFS615.
PREREQ: BISC401 and BISC403.
RESTRICTIONS: Requires instructor approval.

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

BISC 625  CANCER BIOLOGY  3
Provides an integrated lecture series summarizing current knowledge in cancer biology. Topics include: statistics of incidence/survival, pathology, the process of chemical carcinogenesis and sources of carcinogens, genetic and epigenetic mechanisms and consequences, viral and hormonal carcinogenesis as well as current treatment options.
PREREQ: BISC207, BISC401, CHEM103, CHEM104, or CHEM107 and CHEM108, and CHEM321.
RESTRICTIONS: Permission of instructor.

BISC 626  ADVANCED NEUROANATOMY  3
Covers the functional organization of the nervous system from a clinical perspective, with emphasis on the brain stem, cranial nerves, limbic system, and cerebral cortex. Also surveys basic etiology, signs and symptoms of injury to spinal pathways, sensory-motor systems, methods of neuropsych testing, and the Mental Status Exam. Crosslisted with NSCI626.

BISC 627  ADVANCED NEUROPHYSIOLOGY  3
Study of the physiology of the central nervous system, with an emphasis on the cellular and molecular basis of signal transmission in the brain. May be crosslisted with NSCI627, PSYC627.

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

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

BISC 634  ECOTOXICOLOGY AND RISK ASSESSMENT  3
Principles of ecotoxicology are applied along with Environmental Risk Assessment (ERA) tools to solve environmentally related problems. Methodologies to evaluate the effects and fate of biological, chemical and physical stressors are provided along with case studies. Student teams will apply the concepts learned by conducting actual ERAs.

BISC 635  POPULATION ECOLOGY  3
Understand population processes by combining a discussion of theory and practical applications. Includes exponential, logistic, and age-specific growth as well as predation, competition, disease, and metapopulations. Model-building exercises actively used to understand theoretical dynamics.
Crosslisted with ENWG635.
RESTRICTIONS: Requires permission of instructor.

BISC 639  DEVELOPMENTAL NEUROBIOLOGY  4
Developmental biology of the nervous system, including cellular components, neural induction, neurogenesis and neuronal migration, cellular determination, axon outgrowth and pathfinding, synapse formation, programmed cell death, neurotrophic factors, neurodevelopmental disorders, and early critical periods.
PREREQ: BISC305 or BISC401.

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

BISC 643  BIOLOGICAL DATA ANALYSIS  3
Single-Semester introduction to the numerical analysis of biological data in fields such as molecular and cellular biology. Emphasis on choosing and using the correct analysis method for each experiment by using small number of relatively simple statistical tests.
BISC 645  **Bacterial Evolution**  3
Explores the development of the enormous bacterial diversity beginning with
current theories on the origin of life. Examines the evolution of viruses and the
"directed evolution" controversy which concerns mechanisms of bacterial
evolution.
PREREQ: BISC300 or equivalent

BISC 654  **Biochemical Genetics**  3
Covers the use of genetic model organisms to answer biological questions,
including mapping and cloning of human disease genes and the creation of animal
models for human genetic diseases. There is an emphasis on examples from the
recent scientific literature and building scientific writing skills.
PREREQ: BISC403 and BISC401; or permission of instructor

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

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

BISC 665  **Advanced Molecular Biology & Genetics**  3
Presents concepts and approaches regarding our current understanding of
molecular biology and molecular genetics in eukaryotic organisms. Requires a solid
background in biochemistry, cell biology and introductory molecular biology.
RESTRICTIONS: Requires permission of instructor.

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

BISC 675  **Cardiovascular Physiology**  3
Basic physiology of the human cardiovascular system, basis of cardiovascular
diseases and current treatments. The focus is on heart failure, hypertension,
atherosclerosis, thrombosis and leukemia.
PREREQ: A physiology course at or above the 300 level and one of the following:
BISC401, CHEM527, and CHEM641.

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

BISC 682  **Bacterial Pathogens: Molecular Mechanisms**  3
Explore the molecular mechanisms of infectious diseases. Disease transmission
and infection, horizontal gene transfer and pathogenomics are reviewed using
primary research literature. Topics include water and food borne, airborne, vector
borne and human borne pathogens, their molecular mechanisms of invasion,
colonization, virulence and immune avoidance.
PREREQ: BISC300.

BISC 690  **Fundamentals of Pharmacology**  3
Focus on basic principles of drug/receptor interactions, mechanisms of drug
action, and pharmacokinetics. Emphasis on pharmacological problems in the
current experimental literature. Goals are to understand drug-receptor theory,
interpret agonist/antagonist dose-response relationships, and interpret results
from experimental literature in written and oral formats.
RESTRICTIONS: This is a graduate level course. Permission of the instructor is
required for undergraduates.

BISC 693  **Human Genetics**  3
Emphasis on the medical and social implications of our knowledge of human
genetics. Discusses theoretical and practical principles of genetics useful in
studying human variation such as cytogenetics and cell genetics, biochemical
genetics, developmental genetics and teratology, principles of genetic counseling,
multi-factorial inheritance and the genetics of cancer.
PREREQ: BISC403.

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

BISC 805  **Multidisciplinary Biotechnology**  3
Introduces science, engineering, and business graduate students to challenges of
conducting and managing scientific inquiry across disciplines and within industry.
Focuses on biotechnology industry.
Crosslisted with CHEG805.

BISC 806  **Advances in Cell and Organ Systems**  3
Literature-based current topics in cell and organ systems.
PREREQ: Requires permission of instructor. RESTRICTIONS: May be repeated up
to nine credits when topics vary. Offered only in Spring.

BISC 815  **Ethics, Business and Communication**  3
Provides professional development in ethics, business and communication related
to systems biology research applications in stem cell, tissue engineering, and drug
delivery technologies. Intended for PhD students in interdisciplinary life science
and engineering programs.
Crosslisted with BINF815.

BISC 816  **Systems Biology of Cells in Engineered Environments**  3
Provides a technical review of systems biology approaches including genomics,
transcriptomics, proteomics, metabolomics, and bioinformatics as well as
applications in tissue engineering, stem cell differentiation, and drug delivery.
Intended for PhD students in interdisciplinary life science and engineering
programs.
Crosslisted with BINF816.

BISC 822  **Teaching Experience**  2-6
Mentored teaching experience in an undergraduate lecture or laboratory course.
Evaluation based on teaching performance. Each laboratory section taught will
correspond to two credits. Grades will be assigned by the faculty instructor for the
course taught.
RESTRICTIONS: Requires permission of instructor.

BISC 827  **Graduate Research Seminar**  0-1 PF
Seminar allowing graduate students in the Department of Biology to report on the
progress of their research projects. Both students and faculty attend
presentations.

BISC 833  **Special Topics in Biology**  1-4
Various topics in biology.

BISC 850  **Advanced Topics in Biology**  1
Intensive exploration of advanced topics in biological sciences at a level
appropriate for second year graduate students. Subject matter taught will vary
depending on instructor and semester.

BISC 864  **Research Tutorial**  1-8
First year doctoral students will complete six weeks of research training in the
laboratory of a Biological Sciences faculty member. Students may enroll in either
one or two sections of BISC864 in a single semester. Students gain breadth of
research training and are better able to identify appropriate dissertation advisors.
RESTRICTIONS: Requires approval of instructor.

BISC 868  **Research**  1-12

BISC 869  **Master's Thesis**  1-6
Independent research leading to the Master's Thesis.

BISC 872  **Internship**  0-6
Off or on campus practical learning experience under the supervision of a faculty
member requiring two written reports 1) a plan of work outlining the background
of the project and the learning objectives for the internship and 2) a scholarly
paper outlining the objectives of internship, what was accomplished on each
objective and recommendations for future work.
RESTRICTIONS: Requires permission of instructor.

BISC 964  **Pre-Candidacy Study**  3-12 PF
Independent doctoral dissertation research prior to completion of the Ph.D.
Candidacy Examination.

BISC 969  **Doctoral Dissertation**  1-12 PF
Independent dissertation research after completion of the Candidacy Examination.
### BUSINESS: MULTIDISCIPLINARY BUSINESS ADMIN

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<tbody>
<tr>
<td>BMBA 865</td>
<td>CORE UPDATES SEMINAR</td>
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- **Topics**: Include accounting, finance, IT, management, marketing and operations management.
- **PREREQ**: BSBA degree required

### BIOMEDICAL ENGINEERING

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<tbody>
<tr>
<td>BMEG 101</td>
<td>INTRODUCTION TO BIOMEDICAL ENGINEERING</td>
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- **Introduces first year students to college life and provides a learning experience vital to their success at the University, in Engineering, and in Biomedical Engineering. Course content includes that of the university First Year Seminar, technical skills for engineers, and career opportunities in biomedical engineering.**
- **RESTRICTIONS**: First year students only. Biomedical engineering majors only.

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<td>BMEG 166</td>
<td>INDEPENDENT STUDY</td>
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- **The Cellular Laboratory will teach students the fundamentals of cell culture for use in Biomedical Engineering investigations. Students will acquire skills in aseptic cell culture techniques, standard test methods, quantitative analysis, notebook keeping, report writing and oral presentation.**
- **PREREQ**: CHEM104 or CHEM1108, and BISC207. **RESTRICTIONS**: The course is open to BME sophomores, ENGG, Chem & BIO students may take it with the instructors permission.

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<tr>
<td>BMEG 301</td>
<td>QUANTITATIVE CELLULAR PHYSIOLOGY</td>
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- **Mammalian cellular physiology from a quantitative viewpoint. Principles i) cellular and molecular biology, ii) communication, integration, and homeostasis, iii) and nervous, musculoskeletal, and endocrine systems. Topics include molecular and cellular physiology, neurophysiology, musculoskeletal physiology, sensory physiology, somatic and autonomic nervous system physiology, and endocrine physiology.**
- **PREREQ**: BISC207, CHEM103, CHEM104, or CHEM107 and CHEM1108, and MATH241. **RESTRICTIONS**: pen to BME student; ENGG students may take it with the instructor's permission.

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<tr>
<td>BMEG 302</td>
<td>QUANTITATIVE SYSTEMS PHYSIOLOGY</td>
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- **Quantitative approaches to understand the human body during normal function and disease. Examine tissues and organs systems in an integrated manner using principles from engineering kinetics and transport processes. Topics include: anatomy, organ system physiology (cardiovascular, renal, respiratory, gastrointestinal), and pathophysiology.**
- **PREREQ**: BMEG301. **RESTRICTIONS**: The course is open to BME student; ENGG students may take it with the instructor's permission.

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<tr>
<td>BMEG 310</td>
<td>BIOENGINEERING MECHANICS</td>
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- **Introduction to statics, dynamics and mechanics of solids with application to biomedical problems.**
- **PREREQ**: PHYS207 and MATH243.

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<tr>
<td>BMEG 311</td>
<td>BIOENGINEERING MECHANICS II</td>
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- **Introduction to statics, dynamics and mechanics of solids with application to biomedical problems. Topics include viscoelasticity, particle and 3D kinematics and kinetics, impulse, momentum and energy. Continued from BMEG310.**
- **PREREQ**: BMEG310.

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<tr>
<td>BMEG 330</td>
<td>BIOMEDICAL INSTRUMENTATION</td>
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- **Introduction to the basics of measuring and using instrumentation for the purposes of recording electrophysiological signals. Mechanical, chemical, electrical and biological principles for biomedical measurements. Instrumentation for measuring bioelectrical signals, temperature, blood pressure, and body chemistry are covered.**
- **PREREQ**: ELEG305 and MATH305.

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<tr>
<td>BMEG 340</td>
<td>BIOMEDICAL MODELING AND SIMULATION</td>
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- **Developing mathematical models of biomedical processes and experiments. Topics include unit analysis, exponential growth/decay, half-life, exponential vs. age-structured death models, sigmoidal growth models, sigmoidal effect models, mass-action reaction rates, and experimental measurement noise models. Simulation of all of the above using MATLAB.**
- **PREREQ**: MATH305, CISC106. **RESTRICTIONS**: Open to BME students; ENGG students may take it with the instructors permission.

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<tr>
<td>BMEG 341</td>
<td>BIOMEDICAL EXPERIMENT DESIGN &amp; ANALYSIS</td>
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- **Biomedical engineering undergraduate students are introduced to the fundamental principles and techniques involved in the design, execution, and interpretation of biomedical research experiments. In addition to introducing students to analytical techniques used for biomedical data and training them how to properly communicate experimental results, students will have an understanding of their professional and ethical responsibilities as biomedical engineers.**
- **PREREQ**: BMEG340. **RESTRICTIONS**: Open to BME students; ENGG students may take it with the instructor's permission.

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<td>BMEG 350</td>
<td>CLINICAL IMMERSION FOR ENGINEERS</td>
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- **Gain exposure to current clinical practices, identify unmet clinical needs, and consider future career options. Students will be matched with local clinical sites to provide a unique opportunity for innovative and interdisciplinary approaches to problem solving subject to practical constraints.**
- **RESTRICTIONS**: For BME majors only; Limited capacity (depends on number of participating sites available); Students in good standing will be admitted by seniority.

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<td>BMEG 360</td>
<td>BIOMEDICAL ENGINEERING JUNIOR DESIGN</td>
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- **Biomedical engineering problems from industrial and clinical applications are addressed and solved in small groups using problem-based learning methodologies. Team-oriented design project in biomedical engineering, incorporating engineering standards and realistic design constraints. Includes introduction to relevant regulatory, intellectual property, and business management topics.**
- **PREREQ**: BMEG310. **COREQ**: BMEG311. **RESTRICTIONS**: Open to BME student; ENGG students may take it with the instructor's permission.

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<tr>
<td>BMEG 366</td>
<td>INDEPENDENT STUDY</td>
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<tr>
<td>BMEG 401</td>
<td>SYSTEMS PHYSIOLOGY I</td>
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- **Human physiology from a quantitative viewpoint. Anatomy and pathology, where appropriate. Functional/structural aspects of mammalian nervous and musculoskeletal systems. Topics include cellular physiology, autonomous nervous system, neurophysiology and cardiovascular system.**
- **PREREQ**: BISC207, BISC208, PHYS207.

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<tr>
<td>BMEG 402</td>
<td>SYSTEMS PHYSIOLOGY II</td>
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- **Human physiology from a quantitative viewpoint. Anatomy and pathology, where appropriate. Functional/structural aspects of mammalian nervous and musculoskeletal systems. This is the second in the sequence of two courses covering respiratory, renal, digestive, endocrine and musculoskeletal systems in a quantitative and integrative manner.**
- **PREREQ**: BMEG401.

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<td>BMEG 411</td>
<td>ADVANCED TECHNIQUES CELL AND TISSUE</td>
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- **Builds-on the techniques developed in Cell & Tissue Lab I. The experiments include many of the basic experiments that would be used in the development of tissue-engineered products and used in the regulatory approval processes. The students will design and execute independent, open-ended hypothesis-driven experiments.**
- **PREREQ**: BMEG201, BMEG301 or equivalent. **RESTRICTIONS**: Open to BME student; other students may take it with the instructor's permission.

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<td>BMEG 420</td>
<td>BIOLOGICAL TRANSPORT PHENOMENA</td>
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- **Fundamental and biomedical applications of fluid mechanics. Introduction to diffusive and convective mass and heat transfer with biomedical applications.**
- **PREREQ**: PHYS207 and MATH305. **RESTRICTIONS**: Open to BME student; ENGG students may take it with the instructor's permission.

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<td>BMEG 450</td>
<td>BIOMEDICAL ENGINEERING DESIGN</td>
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- **Open-ended team-based design projects in the medical devices or research arena. Systems approach requiring design strategy and concepts, including reliability, safety, ethics, economic analysis, marketing, FDA regulations, and patents.**
- **RESTRICTIONS**: Open to BME seniors only.

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<tr>
<td>BMEG 461</td>
<td>CELL ENGINEERING</td>
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- **Examine how engineered biomaterials can be implemented to regulate cell function with respect to lineage-specific stem cell differentiation, prevention of de-differentiation during culture and expansion, regulation of migration, and induction of proliferation or apoptosis among others.**
- **PREREQ**: BMEG301 or equivalent. **RESTRICTIONS**: Open to BME student; ENGG students may take it with the instructor's permission.

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<td>BMEG 462</td>
<td>ENGINEERING BIOMEDICAL NANOSTRUCTURES</td>
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- **Describes how to use the engineering design process to create, characterize, and evaluate nanoscale structures for biotechnological applications, with an emphasis on noble metal nanoparticles. Topics include understanding and exploiting the physical properties that emerge at the nanoscale; precisely engineering the architecture and properties of noble metal nanoparticles; and rationally designing experiments to evaluate nanomaterials in biological/biomedical settings.**
- **PREREQ**: BMEG301 or equivalent. **RESTRICTIONS**: Open to BME students; other students may take the course with the instructor's permission.
BMEG 463 MECHANO TRANSDUCTION 3
Covers topics of mechanosensation and mechanotransduction in biological systems. Includes the principles and evolution of mechanosensory/mechanotransduction systems, their cellular machinery and mechanisms, and their role in health, disease and the engineering of tissues. PREREQ: BMEG401 or equivalent; BMEG301 or equivalent. COREQ: BMEG302 or equivalent; BMEG420 or equivalent. RESTRICTIONS: Open to BME students; ENGG students may take it with the instructor’s permission.

BMEG 464 MEDICAL DEVICE DEVELOPMENT 3
Explores the medical device design process, from research and development to regulation and commercialization. Through these devices, key concepts in medical device design will be examined including principles of design, biocompatibility, device degradation, sterilization, manufacturing and benefit/risk ratio and regulation. PREREQ: MSEG302. RESTRICTIONS: Open to BME student; other students may take it with the instructor’s permission.

BMEG 466 INDEPENDENT STUDY 1-6

BMEG 471 MATHEMATICAL PHYSIOLOGY 3
Mathematical methods in Human Physiology, covering cellular, tissue, organ, and integrated systems. Dynamic modeling of homeostasis, endocrine regulatory systems, immune response dynamics, mutation and selection. Mathematical methods covered include linear and nonlinear differential equations, Lyapunov analysis, mass action, Hamming spaces, reaction-diffusion equations, and simulation. May be crosslisted with ELEG471. RESTRICTIONS: Seniors only. Requires permission of instructor.

BMEG 479 INTRODUCTION TO MEDICAL IMAGING SYSTEMS 3
Physics, instrumentation, system design, and image reconstruction algorithms will be covered for the following modalities: radiography, x-ray computed tomography (CT), single photon emission computed tomography (SPECT), positron emission tomography (PET), magnetic resonance imaging (MRI), and real-time ultrasound. May be crosslisted with ELEG479. PREREQ: Requires permission of instructor.

BMEG 605 PRINC OF BME I: MOLEC AND CELL SYSTEMS 3
Develop a foundation and fundamental knowledge of Biomedical Engineering with a multi-scale approach. Fundamental concepts of molecular and cellular physiology, applies quantitative engineering analysis to physiology at this length scale, and think critically about the physiology and cell biology literature. PREREQ: General Physiology (BISC 306 or equivalent). RESTRICTIONS: Class size limited to 20. Preference to graduate students in Biomedical Engineering or by permission of instructor.

BMEG 606 PRINC OF BME II: TISS AND ORGAN SYSTEMS 3
Develop a fundamental knowledge of Biomedical Engineering with a multi-scale approach. Fundamental concepts of tissue and organ physiology, applies quantitative engineering analysis at this length scale, and teaches students to think critically about the organ function, such as musculoskeletal, cardiovascular, pulmonary, and nervous systems. PREREQ: General physiology, BISC 306 or equivalent. RESTRICTIONS: Class size limited to 20. Graduate students in biomedical engineering or by permission of instructor.

BMEG 610 TISSUE BIOMECHANICS & MODELING 3
Introduction to fundamental laws and material models used to describe the mechanical behavior of orthopaedic tissues. Nonlinearity, anisotropy, viscoelasticity, inhomogeneity properties of orthopaedic tissues. Constitutive modeling and finite element (FEM) modeling. PREREQ: MSEG310 or equivalent (first order ODE, second order linear ODE, Laplace transform, partial differential equations, use of Matlab as a computational tool).

BMEG 662 ENGINEERING BIOMEDICAL NANO STRUCTURES 3
Describes how to use the engineering design process to create, characterize, and evaluate nanoscale structures for biotechnological applications, with an emphasis on noble metal nanoparticles. Topics include understanding and exploiting the physical properties that emerge at the nanoscale; precisely engineering the architecture and properties of noble metal nanoparticles; and rationally designing experiments to evaluate nanomaterials in biological/biomedical settings. PREREQ: BMEG301 or equivalent. RESTRICTIONS: Open to BME students; other students may take the course with the instructor’s permission.

BMEG 665 TISSUE BIOMECHANICS AND MODELING 3
Introduction to fundamental laws and material models used to describe the mechanical behavior of biological tissues. Application of these models to musculoskeletal tissues. Introduction to numerical methods used to simulate the response of these tissues to physiological loading. PREREQ: BMEG310 or equivalent (statics, strength of materials); MATH305 or equivalent (first order ODE, second order linear ODE, Laplace transform, partial differential equations, use of Matlab as a computational tool). RESTRICTIONS: Open to BME student; other students may take it with the instructor’s permission.

BMEG 666 SPECIAL PROBLEM 1-12

BMEG 671 MATHEMATICAL PHYSIOLOGY 3
Mathematical methods in Human Physiology, covering cellular, tissue, organ, and integrated systems. Dynamic modeling of homeostasis, endocrine regulatory systems, immune response dynamics, mutation and selection. Mathematical methods covered include linear and nonlinear differential equations, Lyapunov analysis, mass action, Hamming spaces, reaction-diffusion equations, and simulation. May be crosslisted with ELEG671. RESTRICTIONS: Seniors, graduate students only.

BMEG 679 INTRODUCTION TO MEDICAL IMAGING SYSTEMS 3
Physics, instrumentation, system design, and image reconstruction algorithms will be covered for the following modalities: radiography, x-ray computed tomography (CT), single photon emission computed tomography (SPECT), positron emission tomography (PET), magnetic resonance imaging (MRI), and real-time ultrasound. May be crosslisted with ELEG679. PREREQ: Requires permission of instructor.

BMEG 695 COMPUTATIONAL SYSTEM BIOLOGY 3
Computational/mathematical techniques for modeling & analysis of biological systems. Includes properties of gene-regulatory and signaling networks; network reconstruction from data; stochastic modeling to study cellular variation & physiological modeling. Crosslisted with BIIN695.

BMEG 801 COMMUNICATION IN BIOMEDICAL ENGINEERING 3
Communication methods for professional development such as written and oral presentations. Writing proposals, journal papers, and dissertations. Oral presentation of research, proposals, and informal presentations. Selecting a research topic, reviewing literature, generating hypotheses, writing study designs. RESTRICTIONS: Class size limited to 20. Graduate students in biomedical engineering or by permission of instructor.

BMEG 815 ETHICS, BUSINESS AND COMMUNICATION 3
Provides professional development in ethics, business and communication related to systems biology research applications in stem cell, tissue engineering, and drug delivery technologies. Intended for PhD students in interdisciplinary life science and engineering programs. Crosslisted with BFIN815.

BMEG 816 SYSTEMS BIOLOGY OF CELLS IN ENGINEERED ENVIRONMENTS 3
Provides a technical review of systems biology approaches including genomics, transcriptomics, proteomics, metabolomics, and bioinformatics as well as applications in tissue engineering, stem cell differentiation, and drug delivery. Intended for PhD students in interdisciplinary life science and engineering programs. Crosslisted with BFIN816.

BMEG 844 COMPUTATIONAL BIOMEDICINE 3
Survey methods and approaches in algorithms, statistics and machine learning, along with their current applications in bio- and medical- informatics. Crosslisted with CISC844. RESTRICTIONS: Should have some background in basic probability and statistics, and background in computing [algorithms]. For students outside CYS, Biomedical Engineering or Bioinformatics, permission from the instructor.

BMEG 866 SPECIAL PROBLEM 1-12

BMEG 868 RESEARCH 1-9

BMEG 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.

BMEG 969 DOCTORAL DISSERTATION 1-12 PF

BIOMECHANICS AND MOVEMENT SCIENCE

BMSC 630 HUMAN MOVEMENT CONTROL 3
BMS 640  Seminar in Motor Systems Neuroscience  0-3
Students present and lead discussion of influential articles in the field of motor systems neuroscience, with an emphasis on supraspinal control of movement. Crosslisted with PHYT640. RESTRICTIONS: Class size limited to 6. Permission to enroll required by course coordinator. Previous course work in basic neuroanatomy and neurophysiology strongly recommended. Course is designed for graduate students, but very strong undergraduates student may enroll.

BMS 666  Special Problem  1-12

BMS 668  Mathematics for Biomechanics  3
Mathematical techniques for research in biomechanics and related fields, with emphasis on methods useful for biomedical signal processing. Topics include Fourier analysis, matrix algebra, and signal processing. Crosslisted with KAAP686. PREREQ: MATH221 and MATH222 or equivalent.

BMS 865  Seminar  0 PF

BMS 866  Special Problem  1-12

BMS 868  Research  1-6

BMS 869  Master's Thesis  1-6

BMS 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.

BMS 969  Doctoral Dissertation  1-12 PF

BIORESOURCES ENGINEERING

BREG 107  Welding and Metals  2
Arc welding, gas welding, soldering, sheet metal layout and fabrication, and properties of metals.

BREG 108  Utilities  2
Domestic water supply and waste disposal, house wiring, heating systems.

BREG 112  Personal Computers and Technology  3
Introduction to personal computers, PC operating systems, programming, and software packages such as spreadsheets and word processing. Statistical and numerical analysis techniques applied to production problems in engineering technology.

BREG 115  Introduction to Computer Based Problem Solving  4
Provides foundation in the application of computers and engineering principles for agriculture, industry and the environmental sciences. Emphasizes fundamentals of computer programming, problem solving and practical applications within the field. Includes a design project and laboratory. COREQ: MATH117 or higher.

BREG 165  Freshman Seminar I  0
Focuses on academic services, career exploration and preparation, campus resources, and practical skills helpful in mastering freshman year. Orientation to the ET major, Professionalism and Ethics. Accreditation issues and introduction to ePortfolios.

BREG 175  Freshman Seminar II  1
Continuation of BREG 165 for Freshman. ePortfolio and resume development, orientation to the ET major.

BREG 209  Technical and Computer Aided Drafting  3
Two dimensional drafting including layouts, geometric constructions, lettering, dimensioning, multiview projections, sectional and auxiliary views using AutoCAD for drafting, entity creation and modification and data management.

BREG 215  Applied Fluid Mechanics  4
Fluid properties, fluid statics, conservation of mass, energy, and momentum as applied to engineering systems. Pipe flow, distribution systems, pumps, open channel flow, hydraulics structures. Laboratory includes flow measurements, energy measurements and analysis of data. PREREQ: MATH221/241 and PHYS201/207. COREQ: CISC106.

BREG 231  Fundamentals of Statics and Strength of Materials  4
Analysis of forces and equilibrium on bodies in two and three dimensions and forces on building components. Stresses, displacement and failure in beams and columns. Strength of wood, steel, concrete and masonry. PREREQ: MATH221/241, PHYS201/207

BREG 244  Electricity for Engineering Technology  4
Electrical power systems for buildings, including distribution equipment and motor selection. Fundamentals of alternating current, single phase and three phase circuits. Laboratory emphasizes control logic and electro-mechanical devices.

BREG 265  Engineering Technology Sophomore Seminar  1
Accreditation, ePortfolio development, resume updates, entrepreneurship, ethics, and professional practice issues. PREREQ: BREG175

BREG 306  Cost Estimating  3
Building components, bill of materials and cost estimating using cost of materials plus labor system. PREREQ: BREG209.

BREG 311  Fundamentals of Thermodynamics  3

BREG 365  Engineering Technology Junior Seminar  1
Accreditation, ePortfolio development, professional certifications and licensure, leadership and ethics, case studies, entrepreneurship, resume updates, preparation for internship experience. PREREQ: BREG265

BREG 366  Independent Study  1-4

BREG 416  Project Economic Analysis  3
Fundamentals of engineering economic analysis. Topics include cash flow, time value of money, equivalence, compound interest formulas, annual cost, present worth, capitalized cost, rate of return, future worth, break even analysis, depreciation and income taxes. Use of computer applications and differential calculus in economic analysis. PREREQ: MATH221 or equivalent, CISC106.

BREG 417  Project Management  3
Basic procedures for finding limiting sequence of events, constructing flow network describing project steps, and project planning and control for optimum scheduling. Project analysis using Critical Path Method (CPM), Project Evaluation and Review Technique (PERT) and linear programming. PREREQ: CISC106. RESTRICTIONS: Junior or senior standing.

BREG 423  Advanced Storm-Water Management  3
Design of gutters, storm drain inlets, and storm drains. Design of distributed and low impact development storm-water management systems. Erosion and sediment control for site development, flood plain hydraulics and analysis. PREREQ: BREG321

BREG 424  Water Supply and Water Treatment Systems  3
Water supply sources, hydraulics of water distribution systems, water softening, sedimentation, chemical precipitation, filtration, and disinfection. PREREQ: BREG215, CHEM103 or CHEM107.

BREG 443  Instrumentation  3
Selection, operating principles and application of physical and chemical devices for indicating, recording and controlling laboratory and field conditions or processes. PREREQ: PHYS202 or PHYS208, BREG244 or equivalent.

BREG 444  Programmable Logic Control Applications  3
Designed to teach application of PLCs and how to use them effectively. Major topics include control systems and terminology, PLC structure and instruction sets, control of sequential processes, and safety and implementation. Applications will be programmed and tested on actual PLCs. PREREQ: CISC106, BREG244 or equivalent.
BREG 445 FOOD ENGINEERING TECHNOLOGY 4
Engineering fundamentals for processing of food materials, including applied thermodynamics and heat transfer principles and operations. Crosslisted with ANFS443. PREREQ: PHYS201. RESTRICTIONS: Not open to majors in mechanical or chemical engineering.

BREG 446 APPLIED CONTROLS 3
The theory, operating principles and application of electrical, mechanical and mechatronic systems for industrial, agricultural and environmental applications. Includes a laboratory and design project. PREREQ: CISC106, CPEG202 and MATH222/242. RESTRICTIONS: Requires junior or senior status in the major or approval of the department.

BREG 450 TECHNICAL PRACTICUM IN INDUSTRY 1-3
Structured experience in industry. A minimum of 40 hours of technical activities per credit hour. Upon completion, students present results to the department faculty and industrial sponsor through written reports and oral presentations. Proposals must be approved in advance by the department faculty, and a designated faculty advisor is required.

RESTRICTIONS: Junior standing. May be repeated for a maximum of 6 credits total.

BREG 454 WOOD AND STEEL STRUCTURES 3
Analysis and design of structures using wood and steel for building materials. Design aspects of building construction.
PREREQ: BREG231 and PHYS201 or PHYS207.

BREG 456 FUNDAMENTALS OF HEATING, VENTILATION AND AIR CONDITIONING 3
Heating, ventilating and air conditioning of rural, residential and light commercial buildings. Heat transmission in structures, space heating and cooling loads, air distribution, piping and fluid flow, heat and water production in livestock and poultry structures, environmental systems for specific plant and animal structures.
PREREQ: CISC106, BREG215 and BREG311.

BREG 465 SENIOR SEMINAR AND CAPSTONE EXPERIENCE 1
Accreditation, professional practice issues, leadership and ethics, ePortfolio submittal for evaluation, report writing, oral presentations.
PREREQ: BREG365

BREG 466 INDEPENDENT STUDY 1-3

BREG 468 UNDERGRADUATE RESEARCH 0-6
Undergraduate research conducted on or off campus, out of class, and under the supervision of a BREG faculty member.

RESTRICTIONS: Requires permission of instructor.

BREG 603 SOIL PHYSICS 3
Examines the importance of soil physics in relation to other disciplines of soil and environmental sciences. Topics include status of water in soil, fundamental principles of water flow, differences between saturated and unsaturated water flow, water balance in the field, infiltration, evapotranspiration, heat, gas and solute (contaminant) transport in soil.
Crosslisted with PLSC603.

BREG 623 ADVANCED STORM-WATER MANAGEMENT 3
Design of gutters, storm drain inlets, and storm drains. Design of distributed and low impact development storm-water management systems. Erosion and sediment control for site development, flood plain hydraulics and analysis.
PREREQ: BREG321

BREG 628 NATURAL WASTEWATER TREATMENT SYSTEMS 3
Land treatment systems for wastewater, biosolids and septage land application, constructed wetlands and aquatic treatment systems, lagoons and decentralized wastewater management.
PREREQ: BREG32B or CIEG233 or CIEG331.

BREG 666 SPECIAL PROBLEM 1-12

BUAD 100 INTRODUCTION TO BUSINESS 3
Survey of basic business concepts designed for non-business major. Topics covered include business organization, management, marketing, operations research and finance.

RESTRICTIONS: No majors within the business administration, finance, accounting, management information systems, or hotel, restaurant, and institutional management degree programs may receive credit for this course.

BUAD 110 BASICS OF BUSINESS 3
Introduction to business for majors to inform them about each of the functional areas of business through lectures, readings, discussions, guest speakers, cases and projects. Includes topics relating to operations, marketing, finance, management, marketing and management information systems, as well as business ethics, and critical thinking and decision making.

RESTRICTIONS: Open to freshmen only.

BUAD 150 BUSINESS BASICS FOR ENTREPRENEURS 4
This course introduces students to basic concepts from accounting, finance, management, and operations management that are pertinent to starting and running a new business. Topics are covered by subject matter experts. Crosslisted with ENTR150. RESTRICTIONS: This course provides foundational knowledge for students who will not otherwise acquire business basics knowledge as part of their major degree program. This course is NOT required for students who complete a business core that includes FINC200 or higher.

BUAD 301 INTRODUCTION TO MARKETING 3
Management of the marketing functions, marketing research, product planning, distribution channels, pricing, personal selling, and advertising. Emphasis on consumer and industrial markets.

RESTRICTIONS: Requires sophomore status.

BUAD 302 MARKETING RESEARCH 3
Focuses on the marketing research process as an aid in marketing decision making. Defining marketing problems, identifying marketing information needs, developing methods to gather information, and applying research results to marketing problems.
PREREQ: BUAD301, and MATH202 or MISY262, and MISY160 or CISC101.

BUAD 306 INTRODUCTION TO SERVICE AND OPERATIONS MANAGEMENT 3
Analysis of major problems faced by operations managers at different levels of management. Topics include scheduling, forecasting, process design, inventory management and quality management.
PREREQ: MATH201. RESTRICTIONS: Requires junior status.

BUAD 309 ORGANIZATIONAL BEHAVIOR 3
Examines individual, group, and organizational determinants of work behavior in organizations. Theory and concepts relevant to individual differences, attitudes, motivation, teams, leadership, power, and organizational culture and change are discussed with an emphasis on applying this knowledge to the challenges of management in a variety of organizations.

RESTRICTIONS: Requires sophomore status.

BUAD 317 SPA/WELLNESS MANAGEMENT & ENTREPRENEURSHIP 3
Spa and Wellness industries are one of the fastest growing segments in the service industry offering a variety of fitness, wellness, life enhancement, and management opportunities. Globally, hotels and hospitals are adding spa/wellness programs to their offerings, as their customers are increasingly demanding complimentary and alternative medicine (CAM). The geographic market of this segment transcends the national borders into international destinations. This program could be offered both at the UD campus or any popular spa/wellness destinations in the world.

BUAD 345 DECISION ANALYTICS AND VISUALIZATION 3
Analytics leverages both the proliferation of data and the advancement of computational tools to bring a new level of sophistication to business decision making. As part of developing an analytic mind and skillset, this course teaches students to properly frame decision problems, represent and understand how to manage uncertainty inherent in those problems, manipulate large data sets using modern software to prescribe recommended actions, and to then compel organizational change through data visualizations.
PREREQ: MISY262 or MATH202 or Equivalent.

BUAD 346 ANALYTICAL DECISION MAKING 3
Intensive treatment of topics covered in BUAD306 to include the investigation and development of the decision making process in operations environment. Emphasis on practical applications.
PREREQ: BUAD306.

BUAD 350 INTRODUCTION TO ENTREPRENEURSHIP 3
This course focuses on understanding the basic concepts, tools, and practices of entrepreneurship and the development of entrepreneurial skills. The entrepreneurial process (opportunity recognition, resource marshaling, and team building driven by communication, creativity, and leadership) and business planning are emphasized.
Crosslisted with ENTR350.
BUAD 351  ENTREPRENEURIAL MARKETING  3
This course covers basic and advanced marketing topics pertinent to bringing new innovations to market, including: product concept testing and the new product development process; customer behavior as it relates to the adoption of new products; and the impact of high technology and other types of entrepreneurial markets; test marketing; market segmentation, targeting, and positioning; the formulation of go-to-market strategies (including product, distribution, promotional, and pricing strategies); and entrepreneurial selling. Crosslisted with ENTR351. 

BUAD 352  BUSINESS LAUNCH PAD  3
This course introduces students to the lean startup concept, and focuses on the development of viable business models. Such models result from customer and other marketplace interactions, so students will be required to get out of the classroom by speaking with customers and others to test hypotheses about the product, the market, channels, revenue streams, costs, and other aspects of their business models. Students will be expected to use marketplace feedback to rapidly iterate/pivot until a viable model is created. Prerequisites: ENTR/BUAD350 and ENTR/BUAD351 or instructor's permission. Crosslisted with ENTR352. Prereq: ENTR/BUAD350 or permission of instructor. 

BUAD 355  ECOTOURISM ENTREPRENEURSHIP  3
Sustainable development has received international recognition and a source of business social and economic responsibility. The underlying principles for a sustainable business development are complex, involving interaction among social, economic, and environmental issues, which make the subject critical for intellectual enquiry. The concept of sustainable development is multidisciplinary requiring students how to draw knowledge from various disciplines, such as business and economics, sociology, environmental sciences, and public administration among others. 

BUAD 363  ENTREPRENEURSHIP IN PRACTICE: INTERNSHIP  3
Emphasizes career development, reflection, and personal assessment. It is designed to accompany a minimum of 100 hours of employment in an entrepreneurial context. Restriction: Enrollment is limited to students who are participating in the E-Internship Program (through the Entrepreneurial Studies Program) or an internship that has been approved by the course instructor. Crosslisted with ENTR364. Prereq: ENTR350 and ENTR351 or permission of Instructor. Restrictions: None. 

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

BUAD 366  INDEPENDENT STUDY  1-6

BUAD 383  SEMINAR ON INTERNATIONAL BUSINESS  3
Surveys the economic, political, and institutional context of international business as well as the strategic operations of the international company. Special attention is given to cross-discipline topics, both in the form of interdisciplinary materials and lectures and institutional and company visits. Restrictions: Taught abroad. 

BUAD 384  GLOBAL BUSINESS ENVIRONMENT  3
Evaluation of the elements of the national, international, and global environments that influence the context and conduct of international business. Emphasizes aspects of the cultural, political, economic, legal-regulatory, trade, financial, and institutional environments. Restrictions: Requires junior status. 

BUAD 386  INTERNATIONAL BUSINESS MANAGEMENT  3
Focuses on management of international business through analysis of opportunities and challenges that face international companies. Develops the perspectives and frameworks that guide how managers direct international business activities. Prereq: BUAD100 or BUAD309. 

BUAD 391  SEMINAR ON INTERNATIONAL MANAGEMENT  3

BUAD 393  SEMINAR ON INTERNATIONAL MARKETING MANAGEMENT  3
Seminar on selected topics in international marketing management. Combines lectures and visits to local organizations. Research paper typically required. Prereq: BUAD301. Restrictions: Taught abroad. Counts as BUAD elective for BS candidates. 

BUAD 394  SEMINAR ON INTERNATIONAL OPERATIONS MANAGEMENT  3
Seminar on selected topics in international operations management. Combines lectures and visits to local organizations. Research paper typically required. Prereq: BUAD306. Restrictions: Taught abroad. Counts as BUAD elective for BS candidates. 

BUAD 411  PROFESSIONAL BASEBALL MANAGEMENT  3
An examination of the operation and management of a professional baseball organization, including a brief history of professional baseball (with focus on types of league competition and player/management relations), as well as the study of the hierarchy of the typical baseball operations department. Restrictions: Open to junior and senior sport management students. 

BUAD 420  LABOR 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. Prereq: BUAD309. 

BUAD 421  HUMAN RESOURCE MANAGEMENT  3
Explores traditional topic areas (e.g., planning, selection, training, compensation, performance appraisal, career development, legal regulations) and contemporary issues (e.g., workforce diversity, the link between human resource strategy and firm strategy) related to the effective management of human resources in organizations. Prereq: BUAD309. 

BUAD 422  DESIGNING EFFECTIVE ORGANIZATIONS  3
Examines practices that contribute to managerial effectiveness, with an emphasis on the organizational level of analysis. Topics include organization structure and design, innovation, growth, leadership, inter-organizational processes and intra-organizational coordination. Prereq: BUAD309. 

BUAD 423  NEGOTIATION AND CONFLICT RESOLUTION  3
Introduces students to the strategy and psychology underlying negotiation and conflict resolution through readings, lectures, and class discussions. Students have the opportunity to put this knowledge into practice by engaging in simulated negotiations with classmates throughout the semester. Topics include preparation, communication, power, emotions, and relationships. Prereq: BUAD309. 

BUAD 424  ETHICS IN THE WORKPLACE  3
Examines the behavioral and organizational underpinnings of ethical and unethical workplace behavior, and the various bases (societal, religious, etc.) on which particular management practices can be ethically evaluated. Students are encouraged to develop their skills in articulating and implementing ethical behavior in businesses and other organizations. Prereq: BUAD309. Restrictions: Requires junior status. 

BUAD 425  CURRENT ISSUES IN GLOBAL BUSINESS  3
Current topics and emerging issues in the changing global marketplace. May focus on regional issues, global business sectors, current issues in the globalization of business, or a combination of these. Prereq: Senior standing or BUAD100 or at least one of ACCT483, BUAD386, ECON340, or FINC415. 

BUAD 426  LEADERSHIP AND TEAMS  3
Provides an analysis of the theories and principles of leadership in organizations. Topics include leadership traits and behaviors, social influence, motivation, and how to cultivate relationships with followers. Examine key aspects of effective teams including member selection, team design and development, collective decision making and team leadership. Prereq: BUAD309. 

BUAD 429  SELECTED TOPICS IN MANAGEMENT  3
Topical seminar on such management issues as organizational socialization, work motivation, and organization-environment relations. Development of an individual research project is stressed. Prereq: BUAD309. 

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

BUAD 444  ENTREPRENEURSHIP AND SMALL BUSINESS MANAGEMENT  3

University of Delaware Course Catalog Fall-2016
BUAD 445  BUSINESS ANALYTICS CAPSTONE  3
Analytics leverages both the proliferation of data and the advancement of computational tools to bring a new level of sophistication to business decision making. As a capstone experience, this course places students in the role of cBusiness Data Analyst. Students will work on large real-world datasets to recommend courses of action to businesses. All phases of the analytics process from data capture to creation of an analytics-driven recommendation or prototype solution will be practiced. PREREQ: MISY430 and BUAD345.

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

BUAD 447  DATA ANALYSIS AND QUALITY CONTROL  3
The new technologies for quality and productivity. Emphasis on actual implementation of total quality management in general and statistical process control in particular. PREREQ: BUAD306. COREQ: BUAD446.

BUAD 448  PROJECT MANAGEMENT: CONSULTING PRACTICUM  3
Effective design and implementation of decision support for operations. Selection of appropriate models for decision support. Emphasis on project work in which an actual decision support system is designed and implemented. PREREQ: BUAD306 and MISY160 or CISC101. RESTRICTIONS: Open to senior operations management majors only.

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

BUAD 450  BUSINESS ACCELERATOR FOR NEW VENTURES  1-6
This course focuses on helping students who have well-developed business ideas and/or existing businesses to accelerate the startup & growth of their companies. The course will begin with the conduct of a business model audit to determine appropriate goals/milestones for each business. Students will then be tasked with developing and implementing strategies to accomplish their goals/milestones. Whenever possible, students will be connected with providers of needed services, financial resources, and mentors. Prerequisites: Students must be licensees of the Venture Center; ENTR/BUAD350, ENTR/BUAD351 or instructor's permission. Notes: This will be a variable credit course, allowing students to earn 1-3 credits per semester up to a total of 6 credits. Crosslisted with ENTR450. PREREQ: ENTR/BUAD 350 AND ENTR/BUAD 351 OR PERMISSION OF INSTRUCTOR.

BUAD 451  SPECIAL TOPICS IN ENTREPRENEURSHIP  3
Examines selected topics of current interest in various areas of entrepreneurship. Prerequisites: ENTR/BUAD350, ENTR/BUAD351 or instructor's permission. Crosslisted with ENTR451. PREREQ: ENTR/BUAD350 ENTR/BUAD351 or permission of instructor.

BUAD 466  INDEPENDENT STUDY  1-6

BUAD 468  UNDERGRADUATE RESEARCH  1-6
Directed research for undergraduate Honors students and Summer Scholars. Research must be scholarly research of thesis level potentially leading to an undergraduate thesis. PREREQ: Upperclass standing. RESTRICTIONS: Permission of instructor and department chairperson.

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

BUAD 471  ADVERTISING AND MEDIA MANAGEMENT  3
Explore a variety of topics including: determining advertising objectives, media planning including media characteristics, media-market measurements and media purchasing; selecting campaign themes and developing creative strategy for traditional and electronic markets; controlling advertising expenditures; the impact of regulations as well as social and economic effects of advertising. PREREQ: BUAD301.

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

BUAD 473  CONSUMER BEHAVIOR  3
Explores a variety of topics including: the decision processes associated with buying, consuming, and disposing of products, services, and ideas; social, cultural, and psychological influences on consumer decision making and consumption patterns; the relationship between consumer behavior and marketing decision making. PREREQ: BUAD301.

BUAD 474  MARKETING CHANNELS AND RETAILING  3
Focus on decision processes involved in establishing the paths for the movement of products, title, payment, and information between producers and users. Emphasis on the decisions necessary for successful retail operations. PREREQ: BUAD301.

BUAD 475  INTERNATIONAL MARKETING  3
Analysis of the concepts and practices relating to the marketing of products and services internationally. Focus on the uncontrollable environmental forces facing an international marketer, issues relating to the standardization of marketing strategies across countries and the unique problems of specific international markets. PREREQ: BUAD100 or BUAD301.

BUAD 476  MARKETING ANALYTICS  3
Explores various quantitatively-based marketing models used to make decisions related to segmentation, positioning, new product diffusion, and allocation of marketing mix expenditures. PREREQ: BUAD301, BUAD302, and MATH202.

BUAD 477  DIGITAL MARKETING  3
Explore the possibility and limitations of various internet marketing media and learn how to apply and adapt basic and advanced marketing strategies to construct and critically evaluate internet marketing efforts, their impact, and their practical use in marketing contexts. Develop skills related to social media, web analytics, and a wide variety of other formats. Examine strategies for creating, managing, and measuring two-way marketing conversations with consumers on a variety of digital platforms, including mobile devices. PREREQ: BUAD301. RESTRICTIONS: Open to international business studies and marketing majors only.

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

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

BUAD 621  DECISION ANALYTICS AND VISUALIZATION  3
Analytics leverages both the proliferation of data and the advancement of computational tools to bring a new level of sophistication to business decision making. As part of developing an analytic mind and skillset, this course teaches students to properly frame decision problems, represent and understand how to manage uncertainty inherent in those problems, manipulate large data sets using modern software to prescribe recommended actions, and to then compel organizational change through data visualizations. PREREQ: BUAD820.

BUAD 622  OPTIMIZATION AND SPREADSHEET MODELLING  3
Managers often find spreadsheets natural, intuitive and user-friendly platforms for organizing information and performing what if analyses. Hence, spreadsheets have therefore become indispensable tools of modern business analysis and decision-making. This class teaches students to structure, represent, analyze, and solve various business problems on Excel spreadsheets. In addition, the course shows students how to leverage mathematical programming solvers to provide prescriptive analytics. PREREQ: BUAD820.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUAD 625</td>
<td>BUSINESS ANALYTICS CAPSTONE</td>
<td>3</td>
<td>Examines the proliferation of data and the advancement of computational tools to bring a new level of sophistication to business decision making. As a capstone experience, this course places students in the role of Business Data Analyst. Students will work on large real-world datasets to recommend courses of action to businesses. All phases of the analytics process from data capture to creation of an analytics-driven recommendation or prototype solution will be practiced. PREREQ: BUAD621 and ACCT804 and MISY631.</td>
</tr>
<tr>
<td>BUAD 635</td>
<td>ADMINISTRATION OF INTERCOLLEGIATE ATHLETICS</td>
<td>3</td>
<td>In-depth analysis of governance, management, marketing and financing of intercollegiate athletics at institutional, conference and national governance levels, including major issues facing leadership of intercollegiate athletics. RESTRICTIONS: Open to MBA and educational leadership majors.</td>
</tr>
<tr>
<td>BUAD 805</td>
<td>MULTIDISCIPLINARY BIOTECHNOLOGY</td>
<td>3</td>
<td>Introduces science, engineering, and business graduate students to challenges of conducting and managing scientific inquiry across disciplines and within industry. Focuses on biotechnology industry. Crosslisted with CHEG805.</td>
</tr>
<tr>
<td>BUAD 811</td>
<td>GLOBALIZATION AND BUSINESS</td>
<td>3</td>
<td>Examines new product productivity, cross-border business development, and international prototype and prototype-related issues. PREREQ: BUAD831.</td>
</tr>
<tr>
<td>BUAD 820</td>
<td>STATISTICAL DATA ANALYSIS FOR BUSINESS</td>
<td>3</td>
<td>Focuses on data analysis for the purpose of measurement, inference, quality and productivity improvement, and improved managerial decision making. Exploratory data analysis, graphical analysis, descriptive statistics, inferential statistics, and techniques such as regression are covered.</td>
</tr>
<tr>
<td>BUAD 831</td>
<td>OPERATIONS MANAGEMENT AND MANAGEMENT SCIENCE</td>
<td>3</td>
<td>Topics include decision analysis tools, mathematical programming, operations strategy, process management and planning and inventory management concepts. PREREQ: BUAD820.</td>
</tr>
<tr>
<td>BUAD 832</td>
<td>OPERATIONS PLANNING AND CONTROL</td>
<td>3</td>
<td>Analyzes problems and advanced decision techniques for effective management of operating resources. Topics include forecasting, capacity requirements determination, operations planning and scheduling, and inventory management. Applications in both manufacturing and service settings are emphasized. PREREQ: BUAD831.</td>
</tr>
<tr>
<td>BUAD 833</td>
<td>INTERNATIONAL OPERATIONS</td>
<td>3</td>
<td>Focuses on issues concerning the management of international operations. Topics include international sourcing for materials and services, location decisions for non-domestic production activities, worldwide logistical systems, and managing non-domestic operations and projects. PREREQ: BUAD831.</td>
</tr>
<tr>
<td>BUAD 834</td>
<td>SPECIAL TOPICS IN OPERATION MANAGEMENT</td>
<td>1-3</td>
<td>Covers various topics in operations management at all levels of the firm. Individual inquiry stressed. PREREQ: BUAD831.</td>
</tr>
<tr>
<td>BUAD 835</td>
<td>MANAGING NEW PRODUCT DEVELOPMENT PROJECTS</td>
<td>3</td>
<td>Examines techniques and issues in project management, with special emphasis on new product development projects. Topics include models for cost estimation, process selection, competitive benchmarking, concurrent engineering, and successful project management. Teams prepare proposal for developing and introducing a new product into the marketplace. PREREQ: BUAD831, BUAD880, FINC850.</td>
</tr>
<tr>
<td>BUAD 836</td>
<td>PROBLEM STRUCTURING AND ANALYSIS FOR DECISION MAKING</td>
<td>3</td>
<td>Introduces problem structuring and analysis for decision making under risk. Emphasizes both applications and methodology. Examines the effects of creativity and problem definition on decision making. Uses various problems involving uncertainty to enhance decision making skills and expand students' awareness and understanding of business problems. PREREQ: BUAD831.</td>
</tr>
<tr>
<td>BUAD 837</td>
<td>DECISION SUPPORT AND EXPERT SYSTEMS FOR BUSINESS</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>BUAD 840</td>
<td>ETHICAL ISSUES IN DOMESTIC AND GLOBAL BUSINESS ENVIRONMENTS</td>
<td>3</td>
<td>Topics include ethics in organizations, and problems and challenges dealing with external environment demands including global issues.</td>
</tr>
<tr>
<td>BUAD 841</td>
<td>MANAGING THE GLOBAL ENTERPRISE</td>
<td>3</td>
<td>Focuses on the development of business strategies and management practices for managing the multinational business organization. RESTRICTIONS: Counts toward MBA as an elective.</td>
</tr>
<tr>
<td>BUAD 843</td>
<td>SPECIAL TOPICS IN GLOBAL BUSINESS</td>
<td>3</td>
<td>Examines selected topics in global business that may focus on one or more areas of the world (e.g. the European Union, Latin America, Pacific Basin, etc.). May be offered overseas.</td>
</tr>
<tr>
<td>BUAD 849</td>
<td>SEMINAR IN BUSINESS ADMINISTRATION</td>
<td>3</td>
<td>With an emphasis on research methodology, individual inquiry, and comparative section of results, students will pursue areas of interest and prepare formal presentations of their findings. PREREQ: Requires 24 MBA credits.</td>
</tr>
<tr>
<td>BUAD 852</td>
<td>MARKET RESEARCH FOR NEW VENTURES</td>
<td>1</td>
<td>New Venture Creation module focuses on marketing issues related to new product development. Addresses how to use research to design products that meet customer needs, assess market potential, and segment heterogeneous markets. Strategic issues related to achieving a desirable market position, overcoming obstacles to successful product diffusion, and building equity in new brands are also considered. Depending on student interests, varying emphasis will be given to business-to-business and business-to-consumer markets. PREREQ: BUAD880.</td>
</tr>
<tr>
<td>BUAD 853</td>
<td>PROJECT PLANNING AND MANAGEMENT</td>
<td>1</td>
<td>Focuses on the innovation process. Various approaches to project planning and management are explored and specific project management techniques such as PACE and Stage Gate process are covered. The objective is to be able to plan an innovation process, know the various tools that are available and to appropriately apply the tools to an innovation project. Learning assessed through a written exam involving a case application. PREREQ: BUAD880.</td>
</tr>
<tr>
<td>BUAD 861</td>
<td>ETHICAL LEADERSHIP DEVELOPMENT</td>
<td>3</td>
<td>Focus is on two primary learning objectives. First objective: explore theory in management, psychology, and neuroscience as well as current popular notions regarding what constitutes effective leadership. Second objective: explore your own personal leadership and management potential through cases, discussions, and diagnostic tools and assessments. PREREQ: BUAD870.</td>
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<tr>
<td>BUAD 864</td>
<td>INTERNSHIP</td>
<td>1-6 PF</td>
<td>Fieldwork designed to allow a student to apply acquired knowledge in a corporate setting. Requires a corporate sponsorship, a performance evaluation to be completed by that sponsor, and a written paper to be submitted to the administrator of internships.</td>
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<tr>
<td>BUAD 870</td>
<td>LEADERSHIP AND ORGANIZATIONAL BEHAVIOR</td>
<td>3</td>
<td>Develops a knowledge base and requisite skills for managing individual, group, and organizational processes through the use of diagnostic models, cases, and/or simulated exercises.</td>
</tr>
<tr>
<td>BUAD 871</td>
<td>MANAGING FOR CREATIVITY AND INNOVATION</td>
<td>3</td>
<td>Focuses on individual characteristics and group and organizational factors that influence the ability of organizations to generate new products and/or processes, and to implement new products/processes. Students practice skills to diagnose barriers and develop creative organizations. PREREQ: BUAD870.</td>
</tr>
<tr>
<td>BUAD 872</td>
<td>STRATEGIC CHANGE AND INNOVATION</td>
<td>3</td>
<td>Examines the organizational processes that influence the ability of organizations to successfully manage change and innovation. Designed to impart theoretical understanding as well as practical tools and frameworks for the management of change and innovation. PREREQ: BUAD870.</td>
</tr>
<tr>
<td>BUAD 873</td>
<td>ADVANCED TOPICS IN LEADERSHIP AND TEAMS</td>
<td>3</td>
<td>Offers an in-depth perspective of leadership and an analysis of teams and teamwork. Emphasizes the practical application of theoretical concepts. PREREQ: BUAD870.</td>
</tr>
<tr>
<td>BUAD 874</td>
<td>SELECTED TOPICS IN MANAGEMENT AND LEADERSHIP</td>
<td>1-3</td>
<td>Examines selected special topics in management and leadership. May be offered on study abroad. PREREQ: BUAD870.</td>
</tr>
</tbody>
</table>
BUAD 875  STRATEGIC HUMAN RESOURCES  3
Takes an evidence-based approach to examining the science and practice of strategic human resource management. This includes HR planning and recruiting, selection, training and development, performance management, and compensation. Throughout, attention is directed toward issues of ethics and the global management of HR.
PREREQ: BUAD870. CORREQ: BUAD870.

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

BUAD 877  SKILLS FOR CHANGE AGENTS  3
Skill and ability for driving change at the individual, team, and organization levels. Team development skills, leadership skills, and negotiation skills are emphasized though simulation exercises.

BUAD 878  LEADING ACROSS BOUNDARIES  3
Leaders in organizations increasingly are called upon to be effective across multiple boundaries, such as different societies and language groups, national cultures, regional subcultures, and levels of economic development. Examines the understanding and develops the ability to create connections and promote collaboration across boundaries.
PREREQ: BUAD870.

BUAD 879  NEGOTIATION AND CONFLICT RESOLUTION  3
Explores the strategy and psychology of negotiation and conflict resolution, including topics such as effective preparation and understanding the role of communication, emotions, and relationships. Simulated negotiations provide the opportunity to put knowledge into practice and acquire feedback on negotiation and conflict resolution skills throughout the semester.
PREREQ: BUAD870.

BUAD 880  MARKETING MANAGEMENT  3
Management of marketing functions in modern profit and non-profit enterprises. Introduction to the marketing management process.
PREREQ: ACCT800 and ECON503

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

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

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

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

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

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

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

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

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

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

BUAD 892  EXPERIENCES IN STRATEGIC INTEGRATION FOR TOP MANAGERS 3
Develop strategic and decision making skills from the perspective of senior management running an organization. The course is designed to help future managers integrate concerns from multiple functions, including finance, marketing, and operations, in addressing complex problems in an uncertain environment. The emphasis is on experiential learning through actual and simulated cases.
PREREQ: FINC850, BUAD831, BUAD870, BUAD880.

BUAD 899  MANAGEMENT CONSULTING PROJECT  3
Develop project management skills and gain practical, applied experience through solving a real life management problem in a team-based setting. Includes presentation of problem solution to client organization.
PREREQ: BUAD870. RESTRICTIONS: MBA advanced elective to be taken after completing an additional 24+ credits in the MBA program.

BUSINESS & ECONOMICS

BUEC 601  BUILDING EMOTIONAL INTELLIGENCE AND CRITICAL THINKING  1
Emotional intelligence and critical thinking are two important factors for leading and working successfully. The first part of this course will focus on building self-awareness and EI such that we better understand how personality preferences impact our motivation, work and communication styles. The second part of this course will focus on developing our analytical and critical thinking in order to understand how we problem-solve and communicate and what cognitive and emotional biases we need to manage to make better decisions.

BUEC 603  COMMUNICATING, BRANDING AND CAREER NETWORKING  1
Learning to be an effective business communicator and storyteller is an essential skill for motivating others and driving your initiatives forward. To do this effectively requires an understanding of how to speak, write and present using a variety of media. Being a strong communicator also helps you shape and build your personal and leadership brand, which in turn, allows you to more intentionally build your business network and manage your career.

COGNITIVE SCIENCE

CGSC 100  FIRST YEAR EXPERIENCE  1 PF
Intended for CGSC Interest Majors. Discusses the rationale for the CGSC curriculum; the work of research labs at UD; graduate school opportunities; career options; and current research in the field.
CGSC 102 LANGUAGE, MIND AND SOCIETY 3
Explores the interrelation between language, mind and society. Topics will vary depending on instructor, but may include: origins of language, impact of culture on language and thought, structural aspects of language variation and the mental representation of language, role of universal grammar in language learning, regional and social variation in language, sociolinguistics of multilingual/multiethnic communities, language change, and the role of language in social and political decision making. Crosslisted with LING102.

CGSC 170 INTRODUCTION TO COGNITIVE SCIENCE 3
Examines three approaches to the study of cognition: The mind as a special type of computer; the mind as an artificial neural network; the mind as brain. Evaluates each view by examining its usefulness for understanding cognitive tasks (vision, memory, language, consciousness), cognitive dysfunction (autism, aphasia, etc.), and artificial intelligence.

CGSC 202 GENES, BONES AND HUMAN EVOLUTION 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. Crosslisted with ANTH202.

CGSC 205 ANTHROPOLOGY AND HUMAN NATURE 3
Archaeological, biological and cultural anthropology organized around the theme of human nature. Crosslisted with ANTH205.

CGSC 266 SPECIAL PROBLEM 1-6

CGSC 310 COGNITIVE SCIENCE INTERNSHIP 1-3
Work with practicing professionals and gain “hands on” work experience in a chosen field in cognitive science.

CGSC 314 BRAIN AND BEHAVIOR 3
Surveys the neural bases of phenomena such as perception, learning, memory, motivation, anxiety, and depression from a psychobiological perspective. Crosslisted with PSYC314. PREREQ: Grade of C- or better in PSYC100 or NSCI100.

CGSC 320 THEORY OF KNOWLEDGE 3
An examination of some central issues in epistemology: classical and contemporary analyses of empirical knowledge; the nature of justification and rationality; implications for science, religion and metaphysics. Crosslisted with PHIL320.

CGSC 327 RACE, GENDER, SCIENCE 3
Critically examines a number of metaphysical, epistemological, and ethical issues related to science of race, gender, and sexual orientation. Topics may include (a) evolution of sex and gender, (b) gender and cognition, (c) biological basis, or lack thereof, of sexual orientation/preference (d) evolutionary, cognitive, historical, and political origins of race thinking, (d) relationship between everyday conceptions of race and gender as compared with scientific conceptions of race and gender, (e) ethical issues raised by human kind classification schemes. Crosslisted with PHIL327.

CGSC 330 PHILOSOPHY OF MIND 3
Coverage of central issues in the philosophy of mind including such topics as the relation between mind and body, the nature of thought, consciousness, perception, personal identity and the relation of cognitive psychology, neuroscience and computer science to the philosophy of mind. Crosslisted with PHIL330.

CGSC 340 COGNITION 3
Examination of how the mind works, covering topics such as perception, vision, attention, memory, language, concepts and decision making. Major themes include understanding the mind/brain relationship, using empirical data to develop and evaluate cognitive theories, and understanding the implications of cognitive research for everyday life. Crosslisted with PSYC340. PREREQ: Grades of C- or better in PSYC207 and in PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301), except for Neuroscience majors. RESTRICTIONS: Open to psychology majors and minors and Neuroscience majors.

CGSC 366 INDEPENDENT STUDY 1-6

CGSC 376 INTRODUCTION TO COMMUNICATION DISORDERS 3
Provides an introduction to the field of communication disorders. Examines the complex behaviors of speech, language and hearing and their changes throughout the lifespan, as well as the variety of communication disorders arising from biological, environmental and behavioral factors. PREREQ: LING101.

CGSC 378 ANATOMY AND PHYSIOLOGY OF SPEAKING 3
Introduction to structures and processes underlying human speech production. Anatomical, physiological and neurological bases of speech-related processes, including breathing, phonation and articulation. Primary emphasis is to learn names and functions of various structures involved in speech production and to gain understanding of how they serve to support speaking in normally functioning humans. PREREQ: A grade of "C" or better in CGSC376.

CGSC 379 INTRODUCTION TO AUDIOLOGY 3
Provides an overview to the field of audiology. Content includes a study of the anatomy and physiology of the hearing mechanism, hearing assessment, classification of hearing disorders, auditory pathologies, and management of hearing loss. PREREQ: Grade of C or better in CGSC376; LING101.

CGSC 380 CLINICAL PRINCIPLES AND PROCEDURES IN SPEECH PATHOLOGY 3
Focuses on clinical principles and procedures in assessment, planning and intervention in speech pathology. Assessment issues related to measurement concepts and descriptive statistics including the use of norm-referenced tests, defining target behaviors and developing observation skills are covered. Treatment planning and intervention include developing a treatment program, getting target behavior baselines and documenting treatment effectiveness. PREREQ: Grade of C or better in CGSC376; LING101.

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

CGSC 410 EMBODIED COGNITION 3
An examination of the thesis that cognition is not sandwiched between the perceptual input and motor output systems, but is spread across the sensory-motor system. This thesis breaks with classical cognitivisms claim that cognition performs computations on symbols, without regard to the sensory system or the motor system.

CGSC 411 NATURALIZED SEMANTICS 3
An examination of theories that purport to explain the naturalistic causal and counterfactual relations between mind and world to establish contents of concepts and thought.

CGSC 418 MEANING AND LANGUAGE USE 3
Introduction to theories of meaning based on the notion of truth and their application to language use. Crosslisted with LING418. PREREQ: LING101.

CGSC 420 RESEARCH METHODS IN COGNITIVE SCIENCE 3
Cognitive science is a multi-disciplinary approach to the study of mind. Provides a practical and hands-on introduction to specific research methods from one or more disciplines (e.g. computational neuroscience modeling, experimental psychology related to cognitive science, or anthropological and linguistic research methods).
PREREQ: PSYC209 or MATH201 or MATH205 or STAT200 or SOCI301. COREQ: PSYC209 or MATH201 or MATH205 or STAT200 or SOCI301.

CGSC 421 PHILOSOPHY, BIOLOGY, SOCIETY 3
Recent topics in philosophy of biology, with emphasis on those related to self, community, and society at large. Topics may include intelligent design, evolutionary altruism, psychological altruism, evolutionary psychology, cultural evolution, evolutionary game theory, and evolutionary ethics. May be crosslisted with PHIL421.

CGSC 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 lecture format with assigned text, a few laboratory sessions provide an introduction to computer-based methods used in instrumental studies of speech. May be crosslisted with LING433. PREREQ: LING253.

CGSC 450 RECENT TOPICS IN PHILOSOPHY OF MIND 3
Recent topics in the philosophy of mind such as theory of mind, naturalized semantics, animal cognition, evolution of language. Crosslisted with PHIL450.

CGSC 451 TOPICS IN COGNITIVE SCIENCE 3
Current topics in cognitive science. PREREQ: CGSC170. 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>CGSC 455</td>
<td>Computational Linguistics</td>
<td>3</td>
<td>Natural language can be studied from a computational perspective. Course content includes aspects of formal language theory, model theory, formal grammars, computational complexity, and computational learning theory as it pertains to natural language syntax, semantics, morphology, and phonology. Crosslisted with LING455. PREREQ: LING101.</td>
</tr>
<tr>
<td>CGSC 466</td>
<td>Independent Study</td>
<td>1-6</td>
<td></td>
</tr>
<tr>
<td>CGSC 470</td>
<td>Elements of Cognitive Science</td>
<td>3</td>
<td>Introduction to the interdisciplinary study of the mind. Concentrates on the symbolic view of mind, and illustrates linguistic, psychological, anthropological, philosophical and computational approaches to language, thought, visual perception and other areas of cognition. Examines the role of representation and algorithm in theories of processing and development.</td>
</tr>
<tr>
<td>CGSC 471</td>
<td>Discovering Human Language</td>
<td>3</td>
<td>Introduction to field linguistics. Examines how languages are put together through a face-to-face encounter with an unknown language. Determine how this language - and human language in general - is constructed. Explores culture, people and even the food where the language is spoken. Crosslisted with LING471. PREREQ: LING101.</td>
</tr>
<tr>
<td>CGSC 481</td>
<td>Artificial Intelligence</td>
<td>3</td>
<td>Programming techniques for problems not amenable to algorithmic solutions. Problem formulation, search strategies, state spaces, applications of logic, knowledge representation, planning and application areas. Crosslisted with CISC481. PREREQ: CISC220 with a minimum grade of C. CISC304. RESTRICTIONS: Credit cannot be received for both CISC481 and CISC681.</td>
</tr>
<tr>
<td>CGSC 485</td>
<td>Seminar in Cognitive Science</td>
<td>3</td>
<td>Intensive study of topics in cognitive science, such as mental representation, vision, computational modeling, disorders. RESTRICTIONS: May be repeated for credit as topic changes.</td>
</tr>
<tr>
<td>CGSC 490</td>
<td>Philosophy of Language</td>
<td>3</td>
<td>Traditional scientific and philosophical issues associated with theories of meaning and reference of language.</td>
</tr>
<tr>
<td>CGSC 496</td>
<td>Psycholinguistics</td>
<td>3</td>
<td>Linguistic approaches to cognition. Issues in the relation of language to thought, universals, language acquisition, and theories of syntactic and semantic processing. May be crosslisted with LING496. PREREQ: LING101.</td>
</tr>
<tr>
<td>CGSC 604</td>
<td>Animal Minds</td>
<td>3</td>
<td>Examines philosophical, theoretical, and methodological issues raised by study of animal cognition and behavior. Topics may include mental continuity between human and nonhuman animals, animal communication and deception, self-recognition, emotions, culture, as well as ethical treatment of animals. May be crosslisted with PHIL604.</td>
</tr>
<tr>
<td>CGSC 610</td>
<td>Embedded Cognition</td>
<td>3</td>
<td>An examination of the thesis that cognition is not sandwiched between the perceptual input and motor output systems, but is spread across the sensory-motor system. This thesis breaks with classical cognitivism’s claim that cognition performs computations on symbols, without regard to the sensory system or the motor system.</td>
</tr>
<tr>
<td>CGSC 611</td>
<td>Naturalized Semantics</td>
<td>3</td>
<td>An examination of theories that purport to explain the naturalistic causal and counterfactual relations between mind and world to establish contents of concepts and thought.</td>
</tr>
<tr>
<td>CGSC 618</td>
<td>Meaning and Language Use</td>
<td>3</td>
<td>A graduate introduction to theories of meaning based on the notion of truth and their application to language use. Crosslisted with LING618.</td>
</tr>
<tr>
<td>CGSC 620</td>
<td>Research Methods in Cognitive Science</td>
<td>3</td>
<td>Cognitive science is a multi-disciplinary approach to the study of mind. Provides a practical and hands-on introduction to specific research methods from one or more disciplines (e.g., computational neuroscience modeling, experimental psychology related to cognitive science, or anthropological and linguistic research methods).</td>
</tr>
<tr>
<td>CGSC 621</td>
<td>Philosophy, Biology, Society</td>
<td>3</td>
<td>Recent topics in philosophy of biology, with emphasis on those related to self, community, and society at large. Topics may include intelligent design, evolutionary altruism, psychological altruism, evolutionary psychology, cultural evolution, evolutionary game theory, and evolutionary ethics.</td>
</tr>
<tr>
<td>CGSC 633</td>
<td>Introduction to Acoustic Phonetics</td>
<td>3</td>
<td>Introduction to articulatory, acoustic, and perceptual characteristics of speech with emphasis on the acoustic properties of phonemes. While primarily lecture format with assigned text, a few laboratory sessions provide an introduction to computer-based methods used in instrumental studies of speech.</td>
</tr>
<tr>
<td>CGSC 642</td>
<td>Mental Representation and Memory</td>
<td>3</td>
<td>Human memory can be conceptualized in terms of representation and information storage within various interrelated mental systems. Critically evaluates research on human memory and representation within the context of more cognitive models. Crosslisted with PSYC642. RESTRICTIONS: Requires permission of instructor.</td>
</tr>
<tr>
<td>CGSC 650</td>
<td>Recent Topics in the Philosophy of Mind</td>
<td>3</td>
<td>Recent topics in the philosophy of mind such as theory of mind, naturalized semantics, animal cognition, evolution of language. Crosslisted with PHIL650.</td>
</tr>
<tr>
<td>CGSC 651</td>
<td>Topics in Cognitive Science</td>
<td>3</td>
<td>Current topics in cognitive science. RESTRICTIONS: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>CGSC 655</td>
<td>Computational Linguistics</td>
<td>3</td>
<td>Natural language can be studied from a computational perspective. Course content includes aspects of formal language theory, model theory, formal grammars, computational complexity, and computational learning theory as it pertains to natural language syntax, semantics, morphology, and phonology. Crosslisted with LING655.</td>
</tr>
<tr>
<td>CGSC 666</td>
<td>Special Problem</td>
<td>1-12</td>
<td></td>
</tr>
<tr>
<td>CGSC 670</td>
<td>Elements of Cognitive Science</td>
<td>3-6</td>
<td>Introduction to the interdisciplinary study of the mind. Concentrates on the symbolic view of mind, and illustrates linguistic, psychological, anthropological, philosophical and computational approaches to language, thought, visual perception and other areas of cognition. Examines the role of representation and algorithm in theories of processing and development.</td>
</tr>
<tr>
<td>CGSC 671</td>
<td>Discovering Human Language</td>
<td>3</td>
<td>Introduction to field linguistics. Examines how languages are put together through a face-to-face encounter with an unknown language. Determine how this language - and human language in general - is constructed. Explores culture, people and even the food where the language is spoken. Crosslisted with LING671.</td>
</tr>
<tr>
<td>CGSC 681</td>
<td>Artificial Intelligence</td>
<td>3</td>
<td>Programming techniques for problems not amenable to algorithmic solutions. Problem formulation, search strategies, state spaces, applications of logic, knowledge representation, planning and application areas. Crosslisted with CISC681. PREREQ: CISC220 and CISC304 or equivalent. RESTRICTIONS: Credit cannot be received for both CISC681 and CISC481.</td>
</tr>
<tr>
<td>CGSC 685</td>
<td>Seminar in Cognitive Science</td>
<td>3</td>
<td>Intensive study of topics in cognitive science, such as mental representation, vision, computational modeling, disorders. RESTRICTIONS: May be repeated for credit as topic changes.</td>
</tr>
<tr>
<td>CGSC 690</td>
<td>Meaning and Reference</td>
<td>3</td>
<td>Traditional scientific and philosophical issues associated with meaning and reference of language.</td>
</tr>
<tr>
<td>CGSC 696</td>
<td>Psycholinguistics</td>
<td>3</td>
<td>Study of linguistic approaches to cognition. Issues in the relation of language to thought: universals, language acquisition and theories of syntactic and semantic processing. May be crosslisted with LING696.</td>
</tr>
<tr>
<td>CGSC 697</td>
<td>Psycholinguistics I</td>
<td>3</td>
<td>An advanced introduction to the psychology of language. Emphasis on the relationship between theories of linguistic knowledge and psychology.</td>
</tr>
</tbody>
</table>
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.

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

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

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

CHEG 304  RANDOM VARIABILITY IN CHEMICAL PROCESSES 3
Fundamental approach to characterization and analysis of randomly varying phenomena. Students will learn to apply the basic principles, methods, and tools in probability and statistics for solving engineering problems involving random phenomena. Applications will include chemical process analysis, manufacturing, system reliability, and design of experiments.
COREQ: MATH302 or MATH305.

CHEG 305  APPLIED MATHEMATICS FOR BIOMED, CHEM AND BIOMOL ENG 3
A special applied mathematics course designed for chemical engineering majors. Emphasis is given on the interaction between mathematical theory and its engineering applications.
PREREQ: CROSSTWITCHEG305. PREREQ: A minimum grade of C- in MATH242 and CISC 106. RESTRICTIONS: For chemical engineering and biomedical engineering majors only. Credits cannot be received for both MATH302 and MATH305.

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

CHEG 332  CHEMICAL ENGINEERING KINETICS 3
Systematic description of rates of homogeneous and heterogeneous chemical reactions of industrial importance. Application of these principles to analysis and design of chemical reactors.
PREREQ: A minimum grade of C- in MATH305, CHEG325 and CHEM444

CHEG 341  FLUID MECHANICS 3
Theory of flow of incompressible viscous and nonviscous fluids; flow of non-Newtonian fluids; empirical correlations for laminar and turbulent flow; and applications in chemical processing.
PREREQ: A minimum grade of C- in CHEG231 and MATH305.
CHEG 595 INTELLUCTUAL PROPERTY FOR ENGINEERS AND SCIENTISTS 3
Methods of protecting intellectual property. Patents, trademarks, copyrights, trade secrets and unfair methods of competition, including analyses of significant court decisions in each area. Directed to innovators in all fields interested in legal protection of their ideas.

CHEG 600 INTRODUCTION TO SCIENCE AND ENGINEERING OF POLYMER SYSTEMS 3
Provides an understanding of the science and engineering of macromolecules from a structure/property perspective. Topics include polymerization, chain structure and configuration, polymer size and shape, phase separation behavior, amorphous and crystalline state, glass-rubber transition, cross linking/rubber elasticity, viscoelasticity, rheology polymer processing and mechanical behavior. May be crosslisted with MSEG630.

CHEG 602 POLYMER PROCESS ANALYSIS AND DESIGN 3
Development of the tools of continuum mechanics necessary for the quantitative description of viscoelastic media. Use of principles of chemical kinetics, fluid and continuum mechanics, and heat and mass transfer to describe the production and processing of polymeric materials.
PREREQ: CHEG342; CHEG600 suggested

CHEG 604 PROBABILITY AND STATISTICS FOR ENGINEERING PROBLEM SOLVING 3
Fundamental approach to modeling, characterization and analysis of random phenomena with the objective of providing students with the basic principles, methods and tools for solving engineering problems involving randomly varying phenomena. Application areas explored include experimental design, manufacturing, system reliability, and cellular biology.
PREREQ: MATH302, MATH305, or equivalent with permission of instructor.

CHEG 605 MULTIPHASE FLUID MECHANICS 3
Presents topics in fluid dynamics of practical importance in the chemical process industries, emphasizing two-phase flow and other advanced topics. Covers two-phase gas-liquid and solid-liquid flow, compressible flow, turbulence, non-Newtonian flow and prime movers.
PREREQ: CHEG341 or other introductory course in fluid mechanics.

CHEG 606 INTRODUCTION TO CATALYSIS 3
Introduction to modern principles of catalysis with emphasis on industrial catalytic reactions, mechanisms and kinetics. Principles of homogeneous organometallic catalysis, supported-metal and solid acid heterogeneous catalysis.
PREREQ: CHEM331 and CHEM444

CHEG 608 INTRODUCTION TO PARTICLE TECHNOLOGY 3
Introduction during which the student encounters (a) the characterization of particle properties and their distributions, (b) the fundamental processes by which particles are formed, grow or shrink in size and are dispersed into and separated from continuous fluid phases, and (c) the population balance that is used to describe particle growth and how processing modifies particle distributions. These ideas are then applied to several case studies drawn from industry.
PREREQ: MATH305, CHEM443, CHEG321 and CHEG341.

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 613 TOPICS IN ENERGY AND THE ENVIRONMENT 3
Non-renewable and renewable energy, along with environmental issues that are likely to arise for an industry will be analyzed in a way that leads to profitable processes and product management while maintaining environmental excellence.
RESTRICTIONS: CHEG Seniors, or CHEG Graduate level status.

CHEG 614 SPECIAL TOPICS IN ENERGY 3
Introduces fundamental and engineering aspects of energy production technology with emphasis on emerging technologies such as microreactors, fuel cells and others.
PREREQ: CHEG332 or equivalent.

CHEG 615 SPECIAL TOPICS IN MIXING 3
Introduces basic principles of fluid dynamics, rheology and turbulence that dictate the mixing behavior required to implement a desired process result. Agitation in vessels and pipeline and viscous mixing discussed. Emphasis on recent research on the effects of mixing on chemical reactions.
PREREQ: CHEG341

CHEG 616 CHEMISTRY AND PHYSICS OF SURFACES AND INTERFACES 3
Fundamental and engineering aspects of metal, semiconductor, and oxide surfaces; their structure and defects, characterization, electronic properties, adsorption and reaction kinetics, surface chemistry and dynamics. Applications to catalysis, microelectronics, and environment sensitive behavior. May be crosslisted with MSEG616. PREREQ: CHEG332 and CHEM444.
RESTRICTIONS: Open to seniors and graduate students only.

CHEG 617 COLLOID SCIENCE AND ENGINEERING 3
Surface thermodynamics and intermolecular forces are related to the properties of colloidal dispersions and micellar and surfactant structures. Applications to biological systems, nanotechnology, powder dispersions and supramolecular structures.
PREREQ: CHEG325 and CHEM444

CHEG 621 METABOLIC ENGINEERING 3
Focuses on design and control of cellular metabolism and includes analysis of metabolic function using systems engineering and molecular biology tools. Goals are to learn computational approaches for analyzing metabolic behavior, and experimental techniques to measure cellular components, metabolites, proteins and nucleic acids.
PREREQ: CHEM527 or CHEM641; MATH305 RESTRICTIONS: Open only to graduate students, seniors and juniors.

CHEG 622 CHEMICALS, RISK AND THE ENVIRONMENT 3
Develops the foundation for understanding the transport and fate of chemical materials in the environment, and how these materials may possibly affect human health and ecology. The principles of heat, mass and momentum transfer, and chemical reaction kinetics are used to develop a quantitative understanding of transport and fate. These are used in conjunction with risk analysis and risk assessment practices to understand how environmental policy evolves.
PREREQ: CHEG325 and CHEG341 COREQ: CHEG342

CHEG 623 RESEARCH TUTORIAL 1-3
First year doctoral students complete research training in the laboratory of a faculty member and report on the progress of their research training experience.
RESTRICTIONS: May enroll in one or two sections in a single semester.

CHEG 624 BIO-BASED MATERIALS 3
The conversion of biomass to useful materials such as polymers and composites has considerable economic and environmental value, particularly in times of global warming and diminishing petroleum oil reserves. Focus on the development of bio-based materials in support of renewable energy (Solar, Wind, Hydro, Hydrogen) and related Advanced Materials Technologies (especially Energy Efficient Housing). The objective of this multidisciplinary approach is to address climate change by providing a sustainable supply of low cost, bio-based materials for the coming renewable energy infrastructure.
RESTRICTIONS: Chemistry, Physics, Math, Engineering background.

CHEG 625 GREEN ENGINEERING 3
Design, commercialization and use of processes and products which are feasible and economical while minimizing generation of pollution at the source and risk to human health and environment.

CHEG 626 STRUCTURE OF MATERIALS 3
Explores the basics of symmetry and mathematical crystallography, scattering of X-rays, electrons, and neutrons, and structural analysis of crystalline materials. Electron imaging with atomic resolution is introduced. Common structure types such as zinc blende, rutile, perovskite, and spinels will be used as examples.
PREREQ: MSEG302 or equivalent.

CHEG 648 BIOMATERIALS FOR DRUG AND GENE DELIVERY 3
Application of biomolecular engineering principles to the design and assembly of biomaterials with specific applications in drug and gene delivery, evaluation of host and cellular-level responses to biomaterials, understanding and application of key principles in targeted delivery and controlled release.
PREREQ: BISC207 or CHEMS27 or permission of instructor.

CHEG 649 MOLECULAR BIOPHYSICS 3
Biophysical principles and methods: thermodynamic and kinetic analysis of folding; protein-nucleic acid interactions; ligand binding; spectroscopy; structural methods; modeling; calorimetry; ultracentrifugation; SPR. Problem solving in macromolecular interactions: protein refolding;altering ligand affinity; increasing protein stability; drug design and HTS; protein expression and solubility; protein engineering. May be crosslisted with CHEM649.
PREREQ: Introductory-level courses in chemistry, physics biochemistry.

CHEG 650 BIOMEDICAL ENGINEERING I 3
Application of engineering concepts and techniques to problems in biomedicine. Mass transfer and chemical reactions in the body, drug distribution, kidney and other organ physiology, and artificial organs.
PREREQ: Upper division or graduate standing in engineering or equivalent COREQ: CHEG443

CHEG 660 SYSTEMS BIOLOGY 3
Emphasizes the systems biology approach and the synergy between experimental data and biological models. Topics include modeling and analysis of gene regulatory and signaling networks, reaction networks, dynamics of microbial population growth, pharmacokinetics, and mechanistic descriptions of diseases.
PREREQ: MATH302 or Basic knowledge of life sciences, programming and statistics preferred but not required.
CHEG 670  Particle Rate Processes 3
Analysis of physicochemical fundamentals and rate equations for key particle formation, growth and size reduction processes including: physical and chemical nucleation, accretional growth mechanisms, collisional growth, droplet and bubble coalescence, solid-state sintering, dissolution and comminution. PREREQ: CHEG332 or equivalent undergraduate Kinetics. RESTRICTIONS: Requires permission of instructor.

CHEG 671  Particle Transport 3
Analysis of the fundamentals of particle motion and their applications to transport processes involving particles, including granular and powder flows, dense and lean-phase pneumatic conveying, and slurry flow. PREREQ: CHEG341 or equivalent undergraduate fluid mechanics. RESTRICTIONS: Requires permission of instructor.

CHEG 672  Mathematics of Particle Systems 3
Analysis of population balance modeling in particulate systems with application to the design of particle-based unit operations. The course will draw on elements of linear algebra, ordinary and partial differential equations as needed to enable the solution of mathematical models of particulate systems based on the rate kernels. PREREQ: Math305 or equivalent undergraduate differential equations. RESTRICTIONS: Requires permission of instructor.

CHEG 673  Particle Properties and Characterization 3
Analysis of particle properties, including single particle, aggregated particle, and particle population descriptors and the various techniques available for sampling, measurement and characterization particle systems. These include methods based on sedimentation, light scattering, particle charging, and microscopy. PREREQ: CHEM444 or equivalent undergraduate level physical chemistry and CHEG325 or equivalent undergraduate thermodynamics. RESTRICTIONS: Requires permission of instructor.

CHEG 674  Particle Processing Operations 3
Analysis of fundamental principles for separating particles from fluids as well as the various means of particle classification into fractions. Separators in wet systems include filters, centrifuges, hydroclones and particle scrubbers. Separators in dry systems include cyclones, electrostatic precipitators. Classifiers include sieves and screens, settlers, and flotation columns. PREREQ: CHEG670 CHEG671 CHEG672 CHEG673. COREQ: CHEG675. RESTRICTIONS: Requires permission of instructor.

CHEG 675  Particle Product Engineering 3
Capstone design course synthesizing the fundamentals of particle science and engineering into the design and production of particle-based products as well as the state-gate process for product engineering and development. Course includes the phases of product conceptualization, feasibility testing, prototyping, assessment of manufacturing needs and costs, and development of a product introduction plan. The students will also develop a business plan for attracting capital necessary to startup a business based on their product concept. PREREQ: CHEG670, CHEG671, CHEG672, and CHEG673. COREQ: CHEG674. RESTRICTIONS: Requires permission of instructor.

CHEG 684  Particle Technology Internship 6
Fieldwork designed to allow a student to apply acquired knowledge in an industrial setting. Requires company sponsorship, a performance evaluation to be completed by that sponsor including an oral presentation, and a written paper to be submitted to the administrator of internships. PREREQ: CHEG670, CHEG671, CHEG672, CHEG673, CHEG674, and CHEG675. RESTRICTIONS: Requires permission of instructor.

CHEG 801  Process Control and Dynamics 3
Advanced concepts on MIMO system modeling, identification, analysis and control appropriate to the chemical and allied industries. Model Predictive Control; robust control and Nonlinear control; statistical methods. Introduction to control systems in physiological processes. PREREQ: Undergraduate control course

CHEG 805  Multidisciplinary Biotechnology 3
Introduces science, engineering, and business graduate students to challenges of conducting and managing scientific inquiry across disciplines and within industry. Focuses on biotechnology industry. May be crosslisted with BISC805, BUAD805, CHEM805.

CHEG 814  Advanced Topics in Energy 3
Advanced topics in fundamental and engineering aspects of energy production technology, with emphasis on emerging technologies such as microreactors, fuel cells and others. RESTRICTIONS: For graduate students only.

CHEG 815  Ethics, Business and Communication 3
Provides professional development in ethics, business and communication related to systems biology research applications in stem cell, tissue engineering, and drug delivery technologies. Intended for PhD students in interdisciplinary life science and engineering programs. Crosslisted with BINF815.

CHEG 816  Systems Biology of Cells in Engineered Environments 3
Provides a technical review of systems biology approaches including genomics, transcriptomics, proteomics, metabolomics, and bioinformatics as well as applications in tissue engineering, stem cell differentiation, and drug delivery. Intended for PhD students in interdisciplinary life science and engineering programs. Crosslisted with BINF816.

CHEG 820  Scattering Methods for Soft Matter 3
Neutron, light, and X-ray scattering techniques provide structural information covering the atomic, nano, and micro length-scales. Provides a practical introduction, including the underlying theory and application of these methods to complex fluids, polymers, self-assembled gels and solutions, nanoparticles, and nanostructured materials.

CHEG 823  Transmission Electron Microscopy in Materials Science 3

CHEG 825  Chemical Engineering Thermodynamics 3
Applications of classical and molecular thermodynamics to industrial problems in chemical and phase equilibrium. Topics include nonideal solutions, high pressure systems, complex reaction equilibria, generalized correlations and equations of state. PREREQ: CHEG325 and CHEM444

CHEG 827  Chemical Engineering Problems 2-3
The application of numerical methods for the solution of chemical engineering problems. Linear and nonlinear analysis. Numerical methods applied to the solution of ODE’s, PDE’s and optimization problems with applications to fluid flow, heat and mass transfer reaction engineering. Monte-Carlo and molecular dynamics. PREREQ: Undergraduate linear algebra and differential equations.

CHEG 828  Statistical Thermodynamics 2-3
A discussion of the concepts of classical statistical mechanics, with special emphasis on applications, thermodynamic modeling and physical properties correlations. PREREQ: CHEG825 or equivalent.

CHEG 831  Chemical Engineering Principles I 3
Equips incoming graduate students with necessary applied mathematical background emerging from a discussion of Chemical Engineering Principles in Kinetics, Thermodynamics, and Transport phenomena. Linear algebra, ordinary differential equations, and stochastic differential equations are typical topics covered. PREREQ: CHEG305 or MATH305, or equivalent.

CHEG 835  Applied Chemical Kinetics 3
Principles of collision theory and transition-state theory. Development of reaction rate expressions based on the laws of elementary reaction steps. Analysis of non-isothermal and non-steady state reactors. PREREQ: Requires undergraduate reaction engineering and physical chemistry

CHEG 836  Advanced Chemical Kinetics 3
Examination of the physical interpretation of kinetic rate expressions via elementary reaction steps, transition state theory, estimation of enthalpies and entropies of activation. Development of reaction networks from elementary kinetic steps using concepts of the steady-state approximation, rate determining step and most abundant reaction intermediate. Application to thermal cracking, pyrolysis, polymerization, combustion and heterogeneous catalysis.

CHEG 841  Chemical Engineering Principles II 4
Second of two required courses (first one CHEG831) to equip graduate students with applied mathematical and statistical background emerging from a discussion of Chemical Engineering Principles in Kinetics, Thermodynamics and Transport Phenomena. Topics include vector and tensor analysis, partial differential equations, statistical analysis of experiments, design of experiments and molecular dynamics, and stochastic simulations. PREREQ: CHEG831.

CHEG 842  Selected Topics in Biochemical Eng 1
PF
Presentation of state-of-the-art research, techniques, and technology in biotechnology. Major core topics include: drug delivery, proteomics and metabolic engineering, biophysical characterization, and protein-protein interactions. RESTRICTIONS: Requires permission of instructor.
CHEM 845 ADVANCED TRANSPORT PHENOMENA 4
Principles and applications of momentum, mass and energy transfer. Topics include molecular analysis of transport, continuum and macroscopic conservation and constitutive equations, scaling and dimensional analysis, and exact and approximate solutions for problems of practical importance. PREREQ: Undergraduate studies in transport phenomena

CHEG 868 RESEARCH 1-9

CHEG 869 MASTER’S THESIS 1-6
Laboratory study of some phase of chemical engineering on which information is lacking, with the goals of contributing new data and theory. Although supervised, work will be independent in nature to encourage the development of initiative.

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

CHEG 969 DOCTORAL DISSERTATION 1-12 PF

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 42 hours of laboratory work that introduces basic experiments in general chemistry. RESTRICTIONS: One year of high school chemistry recommended; high school algebra or concurrent enrollment in MATH100 or higher mathematics course strongly recommended. Only one course among CHEM101, CHEM103, CHEM105, CHEM107, and CHEM111 can count toward graduation.

CHEM 102 GENERAL CHEMISTRY 4
A continuation of CHEM101. Includes 42 hours of laboratory work that is a continuation of the laboratory experience begun in CHEM101. PREREQ: CHEM101. RESTRICTIONS: Only one course among CHEM102, CHEM104, CHEM108, and CHEM112 can count toward graduation.

CHEM 103 GENERAL CHEMISTRY 4
Matter, the changes that matter undergoes, and the laws governing these changes, with greater emphasis on atomic and molecular structure, chemical bonding, and energy relationships. Properties of gases, liquids, solids and solutions. Includes 42 hours of laboratory work. COREQ: MATH114, MATH115, or MATH117 Students whose MATH Placement Examination score placed them in MATH221 or higher need not take a MATH course coincident with CHEM103. 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, CHEM107, and CHEM111 can count toward graduation.

CHEM 104 GENERAL CHEMISTRY 4
Continuation and application of CHEM103 with additional emphasis on chemical spontaneity, equilibrium, rates of reactions, electrochemistry and organic chemistry. Includes 42 hours of laboratory work. PREREQ: CHEM101, CHEM103 or CHEM107, CHEM105, or CHEM111. RESTRICTIONS: For majors in the physical and natural sciences, mathematics and engineering. Only one course among CHEM102, CHEM104, and CHEM112 can count toward graduation.

CHEM 105 GENERAL CHEMISTRY 4
Nuclear chemistry, periodicity, structure and bonding, states of matter, classes of reactions, stoichiometry, solution chemistry, chemical kinetics, equilibria and electrochemistry. COREQ: MATH101 RESTRICTIONS: For nursing majors who will continue with CHEM106. High school algebra required in lieu of corequisite; one year of high school chemistry recommended. Only one course from among CHEM101, CHEM103, CHEM105 and CHEM111 can count toward graduation.

CHEM 106 ELEMENTARY BIOORGANIC CHEMISTRY 5
Survey of organic chemistry and biochemistry, with emphasis on the latter. Includes one three-hour laboratory per week that deals with selected concepts in biochemistry and bioorganic chemistry. PREREQ: CHEM105 RESTRICTIONS: For nursing majors.
CHEM 215 ELEMENTARY ORGANIC CHEMISTRY LABORATORY 1
A survey of elementary laboratory techniques that are useful to organic chemists. Separation and purification techniques and examples of typical organic reactions will be included.
PREREQ: CHEM102 or CHEM104 or CHEM105 or CHEM108 or CHEM112. COREQ: CHEM213. RESTRICTIONS: Designed for students of agriculture, human resources, and medical technology.

CHEM 216 ELEMENTARY BIOCHEMISTRY LABORATORY 1
Basic manipulations and techniques for the characterization of biomolecules.
PREREQ: CHEM213 COREQ: CHEM214

CHEM 220 QUANTITATIVE ANALYSIS 3
Chemical equilibria in aqueous solutions; volumetric and gravimetric analysis; and introduction to chromatography and spectrometry.
PREREQ: CHEM102, CHEM104, CHEM105, CHEM108, or CHEM112. COREQ: CHEM221. RESTRICTIONS: Fall semester only.

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, CHEM105, CHEM108, or CHEM 112. COREQ: CHEM220. RESTRICTIONS: Fall semester only.

CHEM 321 ORGANIC CHEMISTRY I 3
First half of two-semester survey of structure, synthesis, and reactions of organic compounds.
PREREQ: CHEM104 or CHEM108 or CHEM112. COREQ: CHEM325. RESTRICTIONS: Not for CHEM/BIOC BS majors. CHEM321 and CHEM331 cannot both be counted toward graduation.

CHEM 322 ORGANIC CHEMISTRY II 3
Second half of two-semester survey of structure, synthesis and reactions of organic compounds.
PREREQ: CHEM321. COREQ: CHEM326. RESTRICTIONS: Not for CHEM/BIOC BS majors. CHEM322 and CHEM332 cannot both be counted toward graduation.

CHEM 325 ORGANIC CHEMISTRY LABORATORY I 1
Laboratory work that introduces the basic laboratory techniques of organic chemistry.
PREREQ: CHEM104 or CHEM108. COREQ: CHEM325. RESTRICTIONS: Not for CHEM/BIOC BS majors.

CHEM 326 ORGANIC CHEMISTRY LABORATORY II 1
Laboratory work that introduces the basic laboratory techniques of organic chemistry.
PREREQ: CHEM325. COREQ: CHEM326. RESTRICTIONS: Not for CHEM/BIOC BS majors.

CHEM 331 ORGANIC CHEMISTRY 3
Major classes and reactions of organic compounds, emphasizing stereochemistry, reaction mechanisms and synthetic methods.
PREREQ: CHEM104, CHEM108, CHEM112 or CHEM120. COREQ: CHEM333. RESTRICTIONS: For chemistry, biochemistry, chemical engineering and other majors desiring fuller treatment than in CHEM321. CHEM321 and CHEM331 cannot both count toward graduation.

CHEM 332 ORGANIC CHEMISTRY 3
Major classes and reactions of organic compounds, emphasizing stereochemistry, reaction mechanisms and synthetic methods.
PREREQ: CHEM331, CHEM333. COREQ: CHEM334 (except for Chemical Engineering majors). RESTRICTIONS: For chemistry, biochemistry, chemical engineering and other majors desiring fuller treatment than in CHEM321. CHEM322 and CHEM332 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 CHEM108 or preferably CHEM112, or CHEM120. COREQ: CHEM331. RESTRICTIONS: Registration for two credits involves both a lecture period and a laboratory period each week. Registration for one credit involves only the weekly lecture.

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
Introduction to the discipline of biochemistry, integrating its foundations in chemistry, biology, physics, and mathematics through study in a PBL format of a historical series of classic research articles on hemoglobin and sickle cell anemia.
PREREQ: CHEM331.

CHEM 357 INORGANIC CHEMISTRY I 3
Basic theoretical concepts of inorganic chemistry with major emphasis on group theory as applied to structure and bonding of polyatomic chemical compounds and solid state materials. Introduction to chemistry of the elements.
PREREQ: CHEM104, or CHEM108 or CHEM112.

CHEM 366 INDEPENDENT STUDY 1-3 PF

CHEM 402 TEACHING EXPERIENCE 1-3 PF
Teaching experience in an undergraduate laboratory (as a teaching assistant), in tutorial/grading sessions (as a teaching's assistant) or as a problem-based learning workshop mentor. Evaluation based on performance.
RESTRICTIONS: Requires permission of Associate Chair and instructor.

CHEM 410 HISTORY OF CHEMISTRY 3
A survey of the development of chemistry's fields of study emphasizing the nature of individual contributions to the subfields of chemistry.

CHEM 418 INTRODUCTORY PHYSICAL CHEMISTRY I 3
Introduction to the principles of physical chemistry with a focus on thermodynamics, using minimal calculus, for B.A. chemistry and B.S. biochemistry majors.
PREREQ: General chemistry; MATH241; PHYS202 or PHYS208 RESTRICTIONS: Not acceptable for B.S. degree in chemistry. CHEM418 and CHEM444 cannot both be counted toward graduation.

CHEM 419 INTRODUCTORY PHYSICAL CHEMISTRY 3
Introduction to the principles of physical chemistry with a focus on kinetics and spectroscopy, using minimal calculus, for B.A. chemistry and B.S. biochemistry majors.
PREREQ: CHEM418 RESTRICTIONS: Not acceptable for B.S. degree in chemistry. CHEM419 and CHEM444 cannot both be counted toward graduation.

CHEM 437 INSTRUMENTAL METHODS 3
Study of the principles of design and application of spectroscopic, chromatographic and electroanalytical instrumentation in chemical analysis.
PREREQ: CHEM120 or CHEM220 and CHEM221.

CHEM 438 INSTRUMENTAL METHODS LABORATORY 1
Application of spectroscopic, chromatographic and electroanalytical techniques.
PREREQ: CHEM120 or CHEM220 and CHEM221. RESTRICTIONS: May be taken concurrently with or after CHEM437.

CHEM 443 PHYSICAL CHEMISTRY I 3
Application of the principles and methods of mathematics and physics to the quantitative study of chemistry, focusing on thermodynamics.
PREREQ: CHEM120, or CHEM220 and CHEM221; MATH242 (MATH243 recommended); PHYS208 (recommended) or PHYS202. RESTRICTIONS: CHEM418 and CHEM444 cannot both be counted toward graduation.

CHEM 444 PHYSICAL CHEMISTRY II 3
Application of the principles and methods of physics and mathematics to the quantitative study of chemistry, focusing on kinetics and quantum mechanics.
PREREQ: CHEM120, or CHEM220 and CHEM221; MATH242 (MATH243 recommended); PHYS208 (recommended) or PHYS202. RESTRICTIONS: CHEM419 and CHEM444 cannot both be counted toward graduation.

CHEM 445 PHYSICAL CHEMISTRY LABORATORY I 1
Physical methods for studying properties of matter.
PREREQ: CHEM120, or CHEM220 and CHEM221. RESTRICTIONS: To be taken concurrently with or subsequent to CHEM418 or CHEM443 or CHEG231.

CHEM 446 PHYSICAL CHEMISTRY LABORATORY II 1
Physical methods for studying properties of matter.
PREREQ: CHEM120, or CHEM220 and CHEM221. RESTRICTIONS: To be taken concurrently with or subsequent to CHEM419 or CHEM444.

CHEM 457 INORGANIC CHEMISTRY II 3
Overview of the chemistry of transition metal complexes. Emphasis on their structure, bonding and spectroscopy, as well as the mechanistic understanding of their reactivity. Introduction to advanced topics such as organometallic chemistry, bioinorganic chemistry, and the frontiers of inorganic chemistry as applied to the fields of energy, catalysis, human health, and advanced materials.
PREREQ: CHEM418 or CHEM443, and CHEM357.

CHEM 458 INORGANIC CHEMISTRY LABORATORY 1
Laboratory synthesis and characterization of inorganic and organometallic compounds and independent study.
COREQ: CHEM457.

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 faculty.
RESTRICTIONS: Requires permission of instructor. (Letter grade upon completion of written report).

CHEM 527 INTRODUCTORY BIOCHEMISTRY 3
A one-semester survey of the fundamentals of biochemistry.
PREREQ: CHEM321 or CHEM331; CHEM322 or CHEM332 recommended
RESTRICTIONS: Intended for undergraduate majors in biology and chemistry, graduate students in agriculture, biology, nutrition, marine sciences and engineering not using biochemistry professionally. BISC104 or BISC207 strongly recommended.

CHEM 601 INTRODUCTION TO LABORATORY INSTRUCTION 1 PF
Inservice required of first-year graduate teaching assistants. Prepares teaching assistants to become effective instructors. Topics relate to the theory and practice of teaching in a laboratory setting. May be crosslisted with BISC603. COREQ: Having a chemistry (or another science) teaching assistantship.

CHEM 603 PRACTICAL NMR SPECTROSCOPY 1
Elements of NMR spectroscopic techniques, the practical operation of NMR spectrometers, spectral acquisition and special analysis techniques. COREQ: CHEM444 recommended. RESTRICTIONS: Requires permission of instructor.

CHEM 604 PRACTICAL MASS SPECTROMETRY 1
Laboratory experimentation with mass spectrometry. COREQ: CHEM624 recommended as corequisite or prerequisite RESTRICTIONS: Requires permission of instructor.

CHEM 605 SPECTROSCOPY OF ORGANIC COMPOUNDS 1
Introductory organic structure determination by modern spectroscopic methods.
PREREQ: One year of general chemistry RESTRICTIONS: Restricted to graduate students.

CHEM 606 INTRODUCTION TO RESEARCH AT THE CHEMISTRY/BIOLOGY INTERFACE 3
Research experiences in biochemistry, molecular biology, bioanalytical chemistry, bioorganic chemistry, biochemical engineering, materials science, protein crystallography, agricultural biochemistry, virology, and cell biology. Attendance at the weekly Chemistry-Biology Interface Seminar is required.
RESTRICTIONS: Restricted to graduate students admitted to the Chemistry/Biology Interface Program.

CHEM 608 ENVIRONMENTAL SOIL CHEMISTRY 3
Principles of soil chemical reactions and their application to environment including: inorganic and organic soil components, soil solution-solid phase equilibria, sorption phenomena, ion exchange reactions, kinetics of soil chemical processes, redox chemistry, soil acidity and salinity. Crosslisted with PLSC608. PREREQ: CHEM102 or CHEM104, or CHEM108.

CHEM 620 ANALYTICAL SPECTROSCOPY 3
Experimental aspects of electronic and vibrational spectroscopy. Survey of measurements based on optical spectroscopies emphasizing underlying light/matter interactions, operation of major components, and data handling via critique of papers from recent literature.
PREREQ: CHEM437, or permission of instructor.

CHEM 621 CHEMICAL SEPARATIONS 3
Fundamental examination of chemical separation methods and principles. Mathematical modeling of the thermodynamic and steady state principles governing efficiency in chemical separations. Investigation of fundamental chemical separation principles applied to chromatographic instrumentation.
PREREQ: CHEM437, or permission of instructor.

CHEM 622 ELECTROANALYTICAL CHEMISTRY 3
Introduction to the theory and analytical applications of electrochemistry: dynamic and steady-state methods in potentiometry, coulometry, voltammetry, and ancillary techniques.
PREREQ: CHEM437, or permission of instructor.

CHEM 623 CHEMOMETRICS 3
An introduction to modern methods of reducing and analyzing chemical data using computers. A survey of probability and simple statistics, optimization methods, pattern recognition, factor analysis, chemical calibration, regression, time series analysis of chemical data, and data transformation methods.
PREREQ: CHEM437, or permission of instructor.

CHEM 624 PRINCIPLES OF MASS SPECTROMETRY 3
Principles of mass spectral measurements for the elucidation of molecular structure; applications to biomolecular materials and topics from the current literature.
PREREQ: CHEM437 or permission of instructor.

CHEM 625 HETEROGENEOUS ATMOSPHERIC CHEMISTRY 3
Interaction of atmospheric gases with liquids and solid surfaces important in atmospheric and energy sciences. Application of principles of thermodynamics, kinetics, and photochemistry. Coverage of laboratory instrumentation used in heterogeneous chemistry studies.
PREREQ: CHEM437, or permission of instructor.

CHEM 628 CHEMICAL SENSORS 3
Survey of state-of-the-art methods and philosophy for designing and deploying chemical sensors for environmental and biomedical applications. Covers optical, electrochemical, and/or mass-based transduction schemes.
PREREQ: CHEM437 or permission of instructor.

CHEM 629 SURFACE CHEMISTRY AND ANALYSIS 3
An introduction to, and overview of, the principles, methods, and analytical techniques of modern surface science, as used in chemistry and related fields. Course lectures and laboratory analyses using state-of-the-art surface analytical instruments introduce students to theory and practice.
PREREQ: CHEM437 or permission of instructor.

CHEM 630 PRACTICE OF SCIENCE 3
Uses historical, philosophical, and sociological perspectives to better understand the nature of modern science and its practice. Examines "science misconduct," and satisfies the NIH mandate requiring graduate training in "the responsible conduct of research". Crosslisted with BISC631.

CHEM 633 ADVANCED ORGANIC CHEMISTRY: PHYSICAL 3
Sterochemistry and reactivity of organic compounds; and reaction mechanisms, structure and bonding.
PREREQ: CHEM322

CHEM 634 ADVANCED ORGANIC CHEMISTRY: SYNTHESIS AND REACTIVITY 3
Reactions of organic compounds with emphasis on synthetic methods.
PREREQ: CHEM332 COREQ: CHEM633, or permission of instructor.

CHEM 635 ORGANIC REACTIVITY AND TOTAL SYNTHESIS 3
Focuses on the development of new organic reactivity, as exemplified by current accomplishments in the total synthesis of natural products. Additional focus on the strategies of total synthesis.
PREREQ: CHEM634 or permission of instructor.

CHEM 636 CHEMICAL BIOLOGY AND BIOORGANIC CHEMISTRY 3
Application of the concepts and tools of organic chemistry, including molecular design, kinetics and thermodynamics, to problems in biology.
PREREQ: CHEM322 or CHEM332. CHEM527 or CHEM641 strongly recommended.
RESTRICTIONS: In the absence of BIOC coursework, students should have a working knowledge of amino acids and primary, secondary, and tertiary protein structure.

CHEM 641 BIOCHEMISTRY 3
Structure and function of proteins, enzymes and coenzymes; kinetics and mechanisms; carbohydrate metabolism and its regulation; and citric acid cycle.
PREREQ: CHEM322 or CHEM332.

CHEM 642 BIOCHEMISTRY 3
PREREQ: CHEM641.

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: CHEM641.

CHEM 644 MECHANISMS OF ENZYME CATALYSIS 3
Detailed chemical mechanisms of enzyme catalysis for several representatives. Emphasis on kinetic and physical organic methods.
PREREQ: CHEM641 or CHEM527.

CHEM 645 PROTEIN STRUCTURE AND FUNCTION 3
Overview of structural biology, including how x-ray crystallography, NMR spectroscopy, homology modeling and other techniques are used to solve and model structures of macromolecules. Representative proteins discussed in terms of how a protein's structure relates to its function.
PREREQ: CHEM641
CHEM 646 DNA-PROTEIN INTERACTIONS 3
Current topics of DNA-protein interactions which focus on DNA replication, DNA recombination, DNA damage repair, transcription and translation processes. PREREQ: CHEM642.

CHEM 649 MOLECULAR BIOPHYSICS 3
Biophysical principles and methods: thermodynamic and kinetic analysis of folding; protein-nucleic acid interactions; ligand binding; spectroscopy; structural methods; modeling; calorimetry; ultracentrifugation; SPR. Problem solving in macromolecular interactions: protein refolding; altering ligand affinity; increasing protein stability; drug design and HTS; protein expression and solubility; protein engineering. Crosslisted with CHEG649. PREREQ: Introductory-level courses in chemistry, physics biochemistry.

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 653 BIOINORGANIC CHEMISTRY 3
Overview of our current understanding of the role of metal ions in the structure and function of proteins, enzymes and nucleic acids including applications in medicine. Emphasis is placed on the synergy between biochemical and synthetic model studies with examples provided by the current literature. PREREQ: CHEM457.

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

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 ADVANCED QUANTUM CHEMISTRY 3
Applications of quantum theory to predictions of molecular structure, energetics, spectra and reactivity; principles of spectroscopy and the interaction of light with molecules; other topics at the instructor's discretion. PREREQ: CHEM671.

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 678 SURFACE STRUCTURE AND PROPERTIES 3
Explores the structure and chemical properties of solid surfaces involving lectures and laboratory work in a surface science facility. Lectures will be followed by practical applications of surface analytical techniques and computational experiments using density functional theory. PREREQ: CHEM443 and CHEM444 (preferred), or CHEM418 and CHEM419. RESTRICTIONS: Permission of instructor required for students not in chemistry, biochemistry, physics, chemical and biomolecular engineering, materials science and engineering, and plant and soil sciences.

CHEM 679 BIOMOLECULAR NMR SPECTROSCOPY 3
Overview of modern NMR theoretical and experimental approaches used for solving problems in structural biology, biochemistry, and biophysics. Introduction to NMR theory and instrumentation, modern multidimensional NMR experiments; applications to structure, dynamics, protein folding, drug design, ligand and ion binding, mechanisms of enzyme reactions. RESTRICTIONS: Bachelor's degree in chemistry, chemical engineering, physics or related science or engineering field.

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 681 GREEN CHEMISTRY 3
Pollution prevention - how to eliminate toxic chemicals and hazardous wastes while using less energy and, preferably, starting with renewable materials. PREREQ: One year of organic chemistry, or permission of the instructor.

CHEM 683 ENVIRONMENTAL CHEMISTRY 3
Reactions in gas, liquid and solid phases of the Earth's atmosphere, hydrosphere, and geosphere, and energy fluxes and chemical exchanges across these interfaces discussed in the context of basic chemical principles. Applications to current issues such as climate change and air/water pollution discussed. May be crosslisted with MAST683.

CHEM 684 BIOCHEMISTRY OF NUCLEAR ACIDS 3
Focus on contemporary problems in nuclear acid chemistry, with a strong emphasis on the chemical aspects of nuclear acid research. Topics include the structure and function of nucleic acids, the synthesis and modification of DNA/RNA, the repair tolerance of DNA damage, and epigenetic regulation of gene expression. PREREQ: CHEM641.

CHEM 685 COLLOID CHEMISTRY 3
Introduction to the principles of colloid chemistry and discussion of applications, including surface and interfacial thermodynamics, surface and interfacial tension, capillarity, interfacial adsorption, adsorption isotherms, adhesion, contact angles, surface wetting and dewetting, emulsification, foaming and defoaming, interfacial thermodynamics and electrostatics. PREREQ: MATH241. COREQ: MATH242.

CHEM 686 BIOPHYSICAL CHEMISTRY 3
Introduction to biophysical chemistry: molecular forces, conformations and dynamics of macromolecules, theory and applications of biophysical methods, emphasizing spectroscopic and imaging techniques, optical spectroscopy and microscopy, X-ray crystallography, electron microscopy and nuclear magnetic resonance spectroscopy, membrane biophysics. PREREQ: CHEM418 or CHEM443 CHEM527 or CHEM641.

CHEM 805 MULTIDISCIPLINARY BIOTECHNOLOGY 3
Introduces science, engineering, and business graduate students to challenges of conducting and managing scientific inquiry across disciplines and within industry. Focuses on biotechnology industry. Crosslisted with CHEG805.

CHEM 810 KINETICS AND SURFACE CHEMISTRY OF SOLIDS 3
Kinetics and mechanisms of solid chemical reactions, including application of chemical kinetics to natural systems, rates of sorption/desorption, redox, precipitation/dissolution, and ion exchange processes and application of surface spectroscopic and microscopic techniques to elucidate reactions at the soil mineral/water interface. Crosslisted with PLSC810. PREREQ: PLSC608, and either CHEM418 or CHEM443.

CHEM 815 ETHICS, BUSINESS AND COMMUNICATION 3
Provides professional development in ethics, business and communication related to systems biology research applications in stem cell, tissue engineering, and drug delivery technologies. Intended for PhD students in interdisciplinary life science and engineering programs. Crosslisted with BINF815.

CHEM 816 SYSTEMS BIOLOGY OF CELLS IN ENGINEERED ENVIRONMENTS 3
Provides a technical review of systems biology approaches including genomics, transcriptomics, proteomics, metabolomics, and bioinformatics as well as applications in tissue engineering, stem cell differentiation, and drug delivery. Intended for PhD students in interdisciplinary life science and engineering programs. Crosslisted with BINF816.

CHEM 820 SPECIAL TOPICS IN ANALYTICAL CHEMISTRY 1-3
Advanced topics in analytical methods and techniques from the current literature. PREREQ: CHEM437, or permission of instructor. 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.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CHEM 840</td>
<td>Modern Topics in Biochemistry</td>
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<tr>
<td>CHEM 850</td>
<td>Special Topics in Inorganic Chemistry</td>
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<tr>
<td>CHEM 855</td>
<td>Marine Inorganic Chemistry</td>
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<td>CHEM 865</td>
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<td>CHEM 868</td>
<td>Research</td>
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<tr>
<td>CHEM 869</td>
<td>Master’s Thesis</td>
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<tr>
<td>CHEM 874</td>
<td>Special Topics in Physical Chemistry</td>
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<td>CHEM 964</td>
<td>Pre-Candidacy Study</td>
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<tr>
<td>CHEM 969</td>
<td>Doctoral Dissertation</td>
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**Chinese**

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<tr>
<th>Course Code</th>
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<tr>
<td>CHIN 105</td>
<td>Chinese I - Elementary</td>
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<tr>
<td>CHIN 106</td>
<td>Chinese II - Elementary/Intermediate</td>
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<td>CHIN 107</td>
<td>Chinese III - Intermediate</td>
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<tr>
<td>CHIN 200</td>
<td>Chinese Grammar and Composition</td>
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<td>CHIN 201</td>
<td>Advanced Intermediate Chinese I</td>
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<tr>
<td>CHIN 202</td>
<td>Advanced Intermediate Chinese II</td>
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**CHIN 204** | The Art of Chinese Calligraphy                               | 3       |
**CHIN 205** | Chinese Conversation                                        | 3       |
**CHIN 206** | Culture Through Conversation                                  | 3       |
**CHIN 208** | Contemporary Chinese Society                                   | 3       |
**CHIN 266** | Special Problem                                               | 1-4     |
**CHIN 305** | Chinese Conversation and Composition                           | 3       |
**CHIN 350** | Business Chinese                                               | 3       |
**CHIN 355** | Special Topics                                                 | 3       |
**CHIN 366** | Independent Study                                              | 1-3     |
**CHIN 451** | Advanced Readings in Chinese Literature                        | 3       |
**CHIN 452** | Advanced Readings in Chinese Culture                           | 3       |
CHIN 455  CLASSICAL CHINESE  3
Basic training in classical Chinese, the gem of the Chinese language. Introduces students to basic grammatical structures of classical Chinese, its syntactic patterns and historical development, as well as providing comparison with modern vernacular Chinese. PREREQ: Two CHIN courses at the 300 level and one CHIN course at the 400 level.

CHIN 466  INDEPENDENT STUDY  1-3
Discussion of subject matters of students' special interest related to Chinese language, literature, and/or culture. PREREQ: Two courses at the 300 level, one of which must be CHIN305 or CHIN355, or instructor's permission.

CHIN 610  ISSUES IN MODERN CHINA  3
Provides an overall picture of modern and contemporary China in its complexity and diversity. Surveys major aspects of Chinese society such as socioeconomic reforms, societal transformation, modernization drives, privatization, the banking system and foreign trade, and the impact of China's modernization on the world. Taught in Chinese.

CHIN 612  TRANSLATION PRACTICUM I  3
First in a two-course sequence focused on Chinese/English translation. Designed to help students obtain real world experiences in the translation industry by providing them with the opportunity to work with professionals in the industry.

CHIN 613  TRANSLATION PRACTICUM II  3
Second in a two-course sequence focused on Chinese/English translation. Designed to help students obtain real world experiences in the translation industry by providing them with the opportunity to work with professionals in the industry. PREREQ: CHIN612.

CHIN 615  TECHNICAL TRANSLATION  3
Trains students how to translate technically complex texts from the domains of finance, business, and industry. Designed to help students develop a basic proficiency in technical translation, to become skilled in clear expression and to develop sensitivity to stylistic issues involved in specialized translation.

CHIN 617  LEGAL AND MEDICAL TRANSLATION  3
Presents an overview of the field of legal and medical translation from English to Chinese via a wide range of materials, including legal documents, medical journal articles, and information on the pharmaceutical industry. It focuses on problem areas and provides information on sources for this type of translation.

CHIN 619  COMPUTER-ASSISTED TRANSLATION  3
Provides an overview of computer-assisted translation that utilizes computer software and applications to facilitate translation projects and process. Students will learn how to use computer applications such as machine translation, terminology management, database repository, translation memory, digital and online dictionaries, language identifiers, and source text assessment.

CHIN 620  TRANSLATION PRACTICE & INTERNSHIP  6
Immerses students in the 'real world' of translation where they will be engaged in a wide array of projects that involve technical, legal, and medical translation, as well as computer-assisted translation. Under the supervision of the instructors and professional translators, students will be assigned translation projects.

CIVIL AND ENVIRONMENTAL ENGINEERING

CIEG 161  FRESHMAN DESIGN  3
Introduction to engineering analysis and design methods. Elementary theory with design applications to transportation, fluids, and structural systems are introduced through group activities. Additionally, engineering issues related to surveying and sustainability are discussed. Computer applications using computer-aided drafting and engineering analysis software are also included.

CIEG 211  STATICS  3

CIEG 212  SOLID MECHANICS  3
Stresses and displacements in axially loaded beams and in bars subjected to torsion. Analysis of stresses and deflections of laterally loaded beams. Study of stresses and strains in a plate. Mohr's circle for stresses. Failure theories. Design of structural members using strength criteria. PREREQ: CIEG211. COREQ: MATH302 or MATH351.

CIEG 213  CIVIL ENGINEERING MATERIALS LABORATORY  1
Experiments in the mechanics of materials and the strength of materials to complement the content of CIEG212. Emphasis on the behavior of civil engineering materials including steel, aluminum, concrete and timber. PREREQ: CIEG212. COREQ: CIEG212.

CIEG 222  INTRODUCTION TO SURVEYING  3
Emphasizes concepts and methods of plane surveying for construction applications. Provides field experience with modern surveying instruments. Topics include: distance measurement, leveling, angle measurement, error analysis, coordinate systems, mapping, traversing, and calculation of land areas and earth volumes. Crosslisted with PLSC222. RESTRICTIONS: Requires knowledge of trigonometry.

CIEG 233  ENVIRONMENTAL ENGINEERING PROCESSES  3
Quantified descriptions of physical, chemical and biological processes of environmental importance. Introductory level analysis of pollution transport, treatment, containment, remediation. Process engineering approach to contaminant removal methods, including use of appropriate computer software. COREQ: CHEM104 or CHEM108, or CHEM112; MATH242. RESTRICTIONS: Open to majors only.

CIEG 301  STRUCTURAL ANALYSIS  4

CIEG 302  STRUCTURAL DESIGN  4
Basic concepts of structural design including methodologies, applicable limit states and design codes. Structural members and systems, fabrication issues, loads and load paths. Design of steel and concrete members subjected to tension, compression and bending. Additional topics including connections and combined axial compression and bending. PREREQ: CIEG301.

CIEG 305  FLUID MECHANICS  3
Incompressible fluid mechanics: fluid statics, control volume analysis of fluid flows, differential analysis of inviscid and viscous fluid flows and dimensional analysis. PREREQ: MATH302 or MATH351.

CIEG 306  FLUID MECHANICS LABORATORY  1
Experiments in fluid mechanics. PREREQ: CIEG305. COREQ: CIEG305.

CIEG 311  DYNAMICS  3

CIEG 315  PROBABILITY AND STATISTICS FOR ENGINEERS  3
The role of chance and variability in engineering activities. Topics include set operations, probability, Bayes' theorem, random variables, common probability distributions, data reduction, statistical estimation and inference, probability model selection, regression analyses and introduction to probability-based design and Monte-Carlo simulation. PREREQ: MATH242 and MATH243 or equivalents.

CIEG 320  SOIL MECHANICS  3
Soil properties, soil-water interaction, soil stresses, two-dimensional flow, soil compressibility, shear strength and lateral earth pressures. PREREQ: CIEG212. COREQ: CIEG323.

CIEG 321  GEOTECHNICAL ENGINEERING  3
Introduction to Geotechnical Engineering. Topics include shallow foundation analysis and design, deep foundation analysis and design, earth retaining structure analysis and design and introduction to slope stability analysis. PREREQ: CIEG320 and CIEG323.

CIEG 323  SOIL MECHANICS LABORATORY  1
Demonstrates soil properties, soil-water interaction, soil stresses, two-dimensional flow, soil compressibility, shear strength and lateral earth pressures. PREREQ: CIEG212. COREQ: CIEG320.
CIEG 331 ENVIRONMENTAL ENGINEERING 3
Introduction to environmental engineering topics faced by consulting engineers and public works and regulatory agencies. Topics include water treatment, water quality management, wastewater treatment, air pollution control, solid waste management and hazardous waste management.
PREREQ: CIEG305 or MEEG331.

CIEG 333 THERMODYNAMICS FOR ENVIRONMENTAL ENGINEERING 3
Basic thermodynamic laws and concepts and illustration of how they are applicable to environmental engineering problems and processes. A review of the principle of mass and energy conservation, covered in CIEG 233. The first and second laws of thermodynamics and the concepts of enthalpy, entropy, and free energy. Exploration of the thermodynamics of multi-component systems and discussion of equilibrium partitioning and reactions that govern the behaviors of pollutants in environmental compartments.
PREREQ: CIEG323, MATH243, and CHEM104 or CHEM108. A minimum grade of C- in CIEG233 is required.

CIEG 337 ENVIRONMENTAL ENGINEERING LABORATORY 3
Unit operations and unit processes in environmental engineering, with an emphasis on biological processes. Introduction to contaminant transport processes in the subsurface. Utilizes collaborative, problem-based learning within a laboratory context.
PREREQ: C- or higher in CIEG233.

CIEG 343 SITE ENGINEERING 4
Introduction to land grading, site layout, drainage, earthwork volumes and erosion and sediment control for landscape and construction sites. Crosslisted with PLSC343. PREREQ: PLSC/CIEG222 or PLSC150, or CIEG161 or APEC480 or GEOG250 or GEOG372.

CIEG 351 TRANSPORTATION ENGINEERING 3
Four components of transportation: vehicle, way, terminal and control; design and dynamic characteristics of vehicles; geometric design of highways and railroad tracks; operation and design of stations, airports and bus terminals; highway traffic flow analysis.
RESTRICTIONS: Requires junior status in civil engineering.

CIEG 366 INDEPENDENT STUDY 1-6

CIEG 368 UNDERGRADUATE RESEARCH 0-6
Undergraduate research conducted on or off campus, out of class, and under the supervision of a faculty member.
RESTRICTIONS: Requires permission of instructor.

CIEG 401 INTRODUCTION TO THE FINITE ELEMENT METHOD 3
Discusses the following approximate solution techniques: finite difference method, weighted residual and variational methods, and the finite element method. Develops finite element solutions for various one- and two-dimensional problems in applied mechanics. Detailed discussions of various aspects associated with the finite element method (e.g., interpolation functions, element mapping, programming techniques).
PREREQ: MATH351 and MATH353.

CIEG 402 INTRODUCTION TO SUSTAINABILITY PRINCIPLES IN CIVIL ENGINEERING 3
Introduction to the principles of sustainability in the context of civil engineering design and construction. Presentation of life cycle assessment techniques, including software applications; discussion of “green” building materials; evaluation of specific materials for use in “green” construction; and consideration of various sustainable construction assessment tools, including LEED, Green Globes, and similar standards.

CIEG 403 SUSTAINABILITY APPLICATIONS IN INFRASTRUCTURE 3
Explores the application of sustainability principles to civil engineering infrastructure, such as building, site, geotechnical, transportation, and coastal infrastructure projects. Application of life cycle assessment techniques; cost-benefit analyses; evaluation of economic, environmental, and societal impacts of projects; and comparisons of alternative design solutions.

CIEG 407 BUILDING DESIGN 3
Design of building structural systems and elements. Topics include dead and live loading; earthquake and wind forces; load paths; and gravity and lateral load resisting systems. Approximate analysis of building frames and details regarding design elements for steel and concrete buildings.
PREREQ: CIEG301 and CIEG302.

CIEG 408 INTRODUCTION TO BRIDGE DESIGN 3
Provides practical insight into the art and science of bridge design. Various design methodologies in use today in the field of bridge design and evaluation are investigated. Bridges of steel, reinforced concrete, prestressed concrete, wood and composite materials are included.
PREREQ: CIEG302.

CIEG 409 FORENSIC ENGINEERING 3
Provides practical insight into structural engineering by examining failures. Examples include bridge and building failures; infamous catastrophic collapses to little known examples of design criteria being violated to the structures detriment. The main objective is to learn sound engineering practices through the study of failures.
PREREQ: CIEG301 and CIEG302.

CIEG 412 STRUCTURAL STEEL DESIGN 3
Fundamental concepts of structural steel design such as material properties, design methodologies, limit states, and design standards. Design of structural steel members subjected to tension, compression, bending, combined bending and compression, and composite bending are considered. Design of bolted and welded connections is also considered.
PREREQ: CIEG302.

CIEG 413 ADVANCED STRUCTURAL ANALYSIS 3
Introduction to the various methods of analysis of statically indeterminate structures. Force methods and displacement methods are discussed, including method of consistent distortions, equation of three moments, slope deflection, and moment distribution. Approximate methods of analysis, including portal method and cantilever method are also considered.
PREREQ: CIEG301.

CIEG 414 RAILROAD GEOTECHNICAL ENGINEERING 3
Designing, constructing, maintaining railway track. Developing railway track substructure: materials, mechanics, drainage, loading, slopes, design, maintenance, measurements and management and case studies. Track substructure issues related to load freight and high speed passenger rail traffic.
PREREQ: MATH351 and CIEG212 or equivalent. COREQ: MATH353 and CIEG301 or permission of instructor.

CIEG 415 METEOROLLOGIC PROCESSES IN AIR POLLUTION 3
An introduction to meteorological processes that affect air pollution, such as diffusion, atmospheric stability, and turbulence, with a focus on the atmospheric boundary layer. Crosslisted with MAST415. PREREQ: MATH241 and MATH242; CHEM104, CHEM112 or CHEM112; PHYS201 or PHYS207.

CIEG 417 INTRODUCTION TO RAILROAD SAFETY AND DERAILMENT ENGINEERING 3
Explores the engineering issues associated with common types of derailments, including track, equipment and operator derailments. The specific failure mechanisms associated with key classes of derailments will be examined with the technologies available for reducing these types of derailments.
PREREQ: MATH351; CIEG212 or equivalent. COREQ: MATH353; CIEG301 or permission of instructor.

CIEG 418 RAILROAD ENGINEERING 3
Introduction to railroad track structures and their major components; including functions and modes of degradation and failure. Explore static and dynamic load environments and engineering design to effectively distribute loads throughout a structure. Provides both theoretical and practical approaches to track design as well as useful design, optimization and maintenance recommendations for key track components.
PREREQ: MATH351; CIEG212 or equivalent. COREQ: MATH353; CIEG301 or permission of instructor.

CIEG 421 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: CIEG320 and CIEG323.

CIEG 422 EARTH STRUCTURES ENGINEERING 3
Properties of soils and methods to determine them: water flow through inhomogeneous and anisotropic earth mass; predictions of pore-water pressures; stresses and settlement predictions; slope stability: type and causes of slope failures, effective and total stability analyses, design strength parameters and safety factors, construction considerations; design of earth dams; and predictions vs. field performance. Computer software used in problem solving.
PREREQ: CIEG320 and CIEG323.

CIEG 424 EARTH RETAINING STRUCTURES 3
Selection, design and construction of earth retaining structures. Topics include earth pressure theory, and commonly used cut and fill wall types. Practice oriented course utilizes case histories and design examples to demonstrate applications, design procedures, and construction considerations.
PREREQ: CIEG321.

CIEG 426 DEEP FOUNDATIONS 3
PREREQ: CIEG321.
CIEG 428 GROUND IMPROVEMENT METHODS 3
Design and construction principles of ground improvement methods to soil and rock engineering problems. Topics include: grouting, prefabricated vertical drains, stone columns, mechanically stabilized earth systems, soil nailing, soil mixing, vibro compaction, lightweight fill materials and geosynthetics. PREREQ: CIEG321.

CIEG 429 CONCRETE DESIGN 3
Explores the fundamentals of concrete design introduced in CIEG302. Applications of design principles to various reinforced concrete structural elements are considered. Topics include design of doubly reinforced beams; design for torsion; reinforcement details and slender column design. PREREQ: CIEG302.

CIEG 430 WATER QUALITY MODELING 3
Water quality modeling and criteria. Application to lakes, streams, and estuaries. Dissolved oxygen, BOD, nitrification. Eutrophication: carbon, nitrogen, phosphorus and silica mass balances; chlorophyll, primary production and dissolved oxygen; Toxic chemicals: PCBs, PAHs, toxic metals: partitioning theory, organic carbon normalization; coupled water column-sediment models. PREREQ: MATH302 or MATH351.

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 or C- or higher in CIEG233.

CIEG 434 AIR POLLUTION CONTROL 3
Introduces the origins, characteristics and environmental and health effects of priority air pollutants and the equipment commonly used to control emissions of these pollutants from stationary sources. Emphasis placed on understanding the principles, operation and design of different control devices. PREREQ: CIEG305 or MEEG331, CHEG231 or equivalent, C- or higher in CIEG233.

CIEG 436 PROCESSING, RECYCLING, MANAGEMENT OF SOLID WASTES 3
Examines the problem of solid waste management in a throw-away society: landfills, incineration, composting, recycle and reuse options are described from regulatory, economic, and engineering perspectives. Includes design and operational aspects of common processes and landfills, management of hazardous wastes, and future alternatives. PREREQ: CIEG331 or C- or higher in CIEG233.

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: C- or higher in CIEG233.

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

CIEG 439 BIO SUSTAINABILITY AND PUBLIC HEALTH 3
Introduces principles of sustainable engineering; application to ecosystems, water, wastes, agriculture, and how these managed systems affect public health. Application in both developed and developing worlds.

CIEG 440 WATER RESOURCES ENGINEERING 3
Basics of water resources systems and analysis and introduction to hydrologics. Covers water resource systems, rainfall analysis and flood routing, pipe flow and hydraulic machinery, open channel flow and computer models. COREQ: CIEG305 or MEEG331 and CIEG306.

CIEG 442 STORMWATER MANAGEMENT 4
Hydrology and water quality for small urban/suburban/rural watersheds. Design of culverts, vegetated waterways, conventional and distributed stormwater management systems. Crosslisted with PLSC442. PREREQ: CIEG305 or PLSC343 or permission of instructor.

CIEG 443 WATERSHED ENGINEERING, PLANNING AND DESIGN 3
Engineering of watershed management practices to protect and restore quality and quantity of surface and ground waters. Complete water resources projects as part of a service based learning approach. Various projects include rain gardens, bicycle trail drainage, wet detention ponds, bioretention areas, wetlands, stream restoration, and bioengineering. Field oriented course.

CIEG 444 MICROBIOLOGY OF ENGINEERED SYSTEMS 3
Examines macromolecular structure and function, carbon metabolism, and energy metabolism in microbial organisms of use in engineered systems. PREREQ: CHEM103 and CHEM104, or CHEM107 and CHEM108, and BISC207. C- or higher in CIEG233.

CIEG 445 INDUSTRIAL ECOLOGY 3
Focus on recent environmental issues related to climate changes using unconventional tools and approaches. Topics include: climate changes, sustainable development; green transportation systems; eco-industrial parks.

CIEG 451 TRANSPORTATION ENGINEERING LABORATORY 1
Exercises related to transportation: design, control, measurement, calculation/simulation, reasoning, and communication. Topics may include geometric roadway design, traffic signal control, design of transportation terminals, traffic simulation and pedestrian flow, pavement design and maintenance, design justification, and contemporary issues involving transportation policies and technologies. PREREQ: CIEG351. COREQ: CIEG351.

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

CIEG 453 ROADWAY GEOMETRIC DESIGN 3
Physical dimensions of roadways such as vertical and horizontal curvatures, superelevation rates, lane widths, cross sections, and grades. Topics include roadway functions, design controls and criteria, elements of design, local roads and streets, collector roads and streets, rural and urban arterials, freeways, intersections, and grade separations.

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

CIEG 456 REGIONAL ANALYSIS METHODS 3
Analysis of land-use and transportation issues in modern society. Focus on relationships between existing, planned and proposed transportation systems; forecast population and employment distributions. Applications and modeling aspects of these relationships using the latest computer software programs.

CIEG 457 CONTEMPORARY TOPICS IN TRANSPORTATION 3
Expose engineering students to some of the planning and policy aspects, and planning and policy students to some of the engineering aspects of transportation. Topics include transportation and safety, transportation and environment, transportation and sustainability, transportation and energy, transportation and economy, transportation and human health, as well as other contemporary topics.

CIEG 458 PAVEMENT ANALYSIS AND DESIGN 3
Presents both flexible and rigid pavement design procedures, as well as detailed descriptions of various inputs used in the mechanistic pavement design procedures. PREREQ: CIEG351.

CIEG 459 OPTIMAL DESIGN 3
Introduction to optimization techniques and software based solutions for linear and non-linear problems related to engineering design. Develop designs for engineering systems and understand how optimization plays a role. PREREQ: MATH351 or equivalent.

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

CIEG 463 TRAFFIC ENGINEERING AND MODELING 3
Introduction to technical aspects of traffic engineering as applied in everyday projects. Students will explore traffic engineering concepts through practical applications, including the use of software packages such as HCS, Synchro, and Vissim. Software “black box” will be opened to provide each student the ability to diagnose transportation issues and think critically about analysis results. Students will obtain working knowledge of traffic engineering concepts, theories, and methods needed to execute real-world traffic engineering tasks. PREREQ: CIEG351.

University of Delaware Course Catalog Fall-2016
CIEG 464 BUILDING INFORMATION MODELING  3
Building Information Modeling (BIM) in architecture/engineering/construction. Principles/benefits of BIM in software platforms, model facilitating documentation, 3D design exploration, interference checking, digital fabrication, construction industry with real world application.

CIEG 465 GLOBAL SUSTAINABLE ENGINEERING  1-3
Sustainability applied to cultures and economies in the developing world. Planning and implementation of appropriate and alternative technologies. 1 credit seminar with paper or report; 3 credits requires group project with significant technical content using current case study, professional review, and presentation.

CIEG 466 INDEPENDENT STUDY  1-6

CIEG 468 PRINCIPLES OF WATER QUALITY CRITERIA  3
Toxicological and chemical background and technical basis necessary for understanding the models of water and sediment quality criteria for individual and mixtures of organic chemicals and metals that focus on bioavailability: narcosis models of toxicity, complexation models applied to both the water column and sediments. PREREQ: CHEM103 or CHEM104, or CHEM107 or CHEM108. RESTRICTIONS: Requires permission of instructor.

CIEG 469 UNDERGRADUATE RESEARCH  0-6
Undergraduate research conducted on or off campus, out of class, and under the supervision of a faculty member. RESTRICTIONS: Requires permission of instructor.

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: CIEG405

CIEG 486 ENGINEERING PROJECT MANAGEMENT  3
Understand the principles of planning, controlling, and evaluating engineering projects. Learn the use of tools and techniques and practice their use on a personal project. Topics include project organization, project budgeting and scheduling, resource allocation and leveling, change control, and communications. RESTRICTIONS: CIEG486 is only open to Civil Engineering Majors and Minors ONLY.

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

CIEG 601 INTRODUCTION TO THE FINITE ELEMENT METHOD  3
Discusses the following approximate solution techniques: finite difference method, weighted residual and variational methods, and the finite element method. Develops finite element solutions for various one- and two-dimensional problems in applied mechanics. Detailed discussions of various aspects associated with the finite element method (e.g. interpolation functions, element mapping, programming techniques). PREREQ: MATH351 and MATH353.

CIEG 604 PRESTRESSED CONCRETE DESIGN  3

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

CIEG 606 OCEAN AND ATMOSPHERE REMOTE SENSING  3
Fundamentals of ocean and atmosphere remote sensing including space platforms, their orbits, instruments, data retrieval and image processing methods. Oceanographic and atmospheric applications of remote sensing and new developments in sensors and data analyses. Crosslisted with MAST606.

CIEG 608 INTRODUCTION TO BRIDGE DESIGN  3
Provides practical insight into the art and science of bridge design. Various design methodologies in use today in the field of bridge design and evaluation are investigated. Bridges of steel, reinforced concrete, prestressed concrete, wood and composite materials are included. PREREQ: CIEG302

CIEG 611 STRUCTURAL DYNAMICS DESIGN  3
Design of structures (buildings, bridges, dams, foundation piles and offshore platforms) for dynamic loadings (severe wind force, ocean wave force, strong earthquake excitations, machine vibrations, and general impulse and time dependent forces and motions). Determination of realistic dynamic loadings and application of design concepts. PREREQ: CIEG311 and MATH302 or MATH351.

CIEG 612 ADVANCED MECHANICS OF MATERIALS  3
Covers unsymmetrical bending, shear center in thin-walled beams, torsion in thin-walled structures, lateral-torsional buckling, curved beams, energy methods, principal stress and strain in three dimensions. Theory and applications.

CIEG 614 RAILROAD GEOTECHNICAL ENGINEERING  3
Designing, constructing, maintaining railway track. Developing railway track substructure: materials, mechanics, drainage, loading, slopes, design, maintenance, measurements and management and case studies. Track substructure issues related to load freight and high speed passenger rail traffic. PREREQ: MATH351 and CIEG212 or equivalent.

CIEG 615 METEOROLOGIC PROCESSES IN AIR POLLUTION  3
An introduction to meteorological processes that affect air pollution, such as diffusion, atmospheric stability, and turbulence, with a focus on the atmospheric boundary layer. Crosslisted with MAST615. PREREQ: MATH 241 and MATH 242; CHEM104 or CHEM108 or CHEM112; PHYS201 or PHYS207

CIEG 617 INTRODUCTION TO RAILROAD SAFETY AND DERAILMENT ENGINEERING  3
Explores the engineering issues associated with common types of derailments, including track, equipment and operator derailments. The specific failure mechanisms associated with key classes of derailments will be examined with the technologies available for reducing these types of derailments. PREREQ: MATH351; CIEG212 or equivalent. COREQ: MATH353; CIEG301 or permission of instructor.

CIEG 618 RAILROAD ENGINEERING  3
Introduction railroad track structures and their major components; including functions and modes of degradation and failure. Explore static and dynamic load environments and engineering design to effectively distribute loads throughout a structure. Provides both theoretical and practical approaches to track design as well as useful design, optimization and maintenance recommendations for key track components. PREREQ: MATH351; CIEG212 or equivalent. COREQ: MATH353; CIEG301 or permission of instructor.

CIEG 620 SOIL MECHANICS II  3
Behavior of cohesionless and cohesive soils; failure theories and lateral earth pressures; stresses within earth mass; steady-state flow through porous media; consolidation and time rate settlement; shear strength of cohesive soils. PREREQ: CIEG302/323

CIEG 621 FOUNDATION ENGINEERING  3
Field investigation techniques; interpretation of data; theory and design of shallow and deep foundations, retaining walls, sheet pile walls, caissons braced excavations and geosynthetically reinforced soil.

CIEG 622 EARTH STRUCTURES ENGINEERING  3
Properties of soils and methods to determine them: water flow through inhomogeneous and anisotropic earth mass; predictions of pore-water pressures; stresses and settlement predictions; slope stability: type and causes of slope failures, effective and total stability analyses, design strength parameters and safety factors, construction considerations; design of earth dams; and predictions vs. field performance. Computer software used in problem solving. PREREQ: CIEG320 and CIEG323.

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, traxial (CU, CD, UU) tests simulating various loading paths, and liquefaction. PREREQ: CIEG320 and CIEG323.
CIEG 619  ENVIRONMENTAL HAZARDS  3

CIEG 622  ENVIRONMENTAL GEOLOGY  3

CIEG 624  EARTIIN RETAINING STRUCTURES  3

Selection, design and construction of earth retaining structures. Topics include earth pressure theory, and commonly used cut and fill wall types. Practice oriented course utilizes case histories and design examples to demonstrate applications, design procedures, and construction considerations.
PREREQ: CIEG231.

CIEG 626  SOIL BEHAVIOR  3

Measuring the shear strength of soils. Soil behavior of soil examined from a fundamentally soil perspective. Review of methods of testing to define response; rationale for choosing shear strength and deformation parameters of soils for design applications.

CIEG 627  DEEP FOUNDATIONS  3

Examines driven piles, drilled shafts, augercast and micropiles. Includes development of cost comparisons, specifications, contract documents and bidding practices. Design issues address the geotechnical and structural considerations.

CIEG 628  GROUND IMPROVEMENT METHODS  3

Design and construction principles of ground improvement methods to address soil and rock engineering problems. Topics include: grouting, prefabricated vertical drains, stone columns, mechanically stabilized earth systems, soil nailing, soil mixing, vibro compaction, lightweight fill materials and geosynthetics.

CIEG 629  CONCRETE DESIGN  3

Explores the fundamentals of concrete design introduced in CIEG 302. Applications of design principles to various reinforced concrete structural elements are considered. Topics include design of doubly reinforced beams; design for torsion; reinforcement details and slender column design.
PREREQ: CIEG302.

CIEG 630  WATER QUALITY MODELING  3

Water quality modeling and criteria. Application to lakes, streams, and estuaries. Dissolved oxygen, BOD, nitrification. Eutrophication: carbon, nitrogen, phosphorus and silica mass balances; chlorophyll, primary production and dissolved oxygen; Toxic chemicals: PCBs, PAHs, toxic metals: partitioning theory, organic carbon normalization; coupled water column-sediment models.
PREREQ: MATH302 or MATH351.

CIEG 632  CHEMICAL ASPECTS OF ENVIRONMENTAL ENGINEERING  3

The principles and applications of aqueous chemistry to environmental systems. Includes a review of general chemistry, with emphasis on the structure of matter and stoichiometry; chemical thermodynamics; chemical kinetics; equilibrium reactions in homogeneous and heterogeneous solutions; applied electrochemistry and Redox reaction; and interfacial phenomena.

CIEG 633  HAZARDOUS WASTE MANAGEMENT  3

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

CIEG 634  CONTAMINANT TRANSPORT AND SEPARATION IN ENVIRONMENTAL SYSTEMS  3


CIEG 635  AIR POLLUTION AND ITS CONTROL  3

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

CIEG 636  BIOLOGICAL ASPECTS OF ENVIRONMENTAL ENGINEERING  3

Presents fundamental molecular biological concepts which pertain to cellular function in the environment and in engineered environmental treatment systems. Briefly reviews elementary organic chemical classifications.
PREREQ: CIEG233.

CIEG 637  WATER AND WASTEWATER QUALITY  3

Principles and applications of analysis of solids, organic load, dissolved oxygen, disinfectants, nutrients, trace metals, trace organic compounds and microorganisms. Lecture and laboratory.
PREREQ: CIEG233

CIEG 638  ALLIED ENVIRONMENTAL STATISTICS AND DATA ANALYSIS  3

Statistical and graphical tools useful for practicing environmental scientists and engineers. Modern computer based methods: tests of significance, maximum likelihood estimates; bootstrap based confidence limits; linear, nonlinear and errors-in-variables regression; censored (less/greater than) data; probability and box and whisker plots; analysis of variance.

CIEG 639  OCEAN FLUID DYNAMICS  4

Kinematics and dynamics of incompressible fluids with emphasis on coastal and ocean problems. Governing equations, examples of solutions for viscous flows, potential flows, vorticity, flows on a rotating planet, density vary flows, boundary layers, turbulence.
PREREQ: CIEG305.

CIEG 641  RISK ANALYSIS  3

Framework to understand, characterize, and support decisionmaking involving risk. Specific engineering risk analysis concepts and methods, e.g., fault trees, event trees, Markov models, simulation. Focus on engineering perspective, but includes some discussion of interdisciplinary context. Applications to all areas of engineering. Many real-world case studies.
PREREQ: CIEG315 or equivalent.

CIEG 642  ADVANCED DATA ANALYSIS  3

The course presents a comprehensive introduction to the principles and practices of emerging advanced data analysis with particular focus to engineering science. The course will attempt to provide insight to advanced statistical techniques and methods of analyzing BIG DATA will be the main focus.
PREREQ: CIEG315.

CIEG 643  WATERSHED ENGINEERING, PLANNING AND DESIGN  3

Engineering of watershed management practices to protect and restore quality and quantity of surface and ground waters. Complete water resources projects as part of a service based learning approach. Various projects include rain gardens, bicycle trail drainage, wet detention ponds, bioretention areas, wetlands, stream restoration, and bioengineering. Field oriented course.

CIEG 644  MICROBIOLOGY OF ENGINEERED SYSTEMS  3

This course covers macromolecular structure and function, carbon metabolism, and energy metabolism in microbial organisms of use in engineered systems.
PREREQ: CHEM103 and CHEM104, or CHEM107 and CHEM108, and BISC207 and CIEG233.

CIEG 645  INDUSTRIAL ECOLOGY  3

Focus on recent environmental issues related to climate changes using unconventional tools and approaches. Topics include: climate changes; sustainable development; green transportation systems; co-industrial parks.

CIEG 650  URBAN TRANSPORTATION SYSTEMS  3

Design and operation of urban transportation systems, characteristics of public transportation modes, vehicle design, right-of-way types and terminal facilities. Application of operations research techniques to analysis of scheduling, network optimization, capacity and evaluation of alternatives.
May be crosslisted with APEC650.

CIEG 652  TRANSPORTATION FACILITIES DESIGN  3

Theoretical concepts of general transportation demand, supply and flow analysis. Planning and design of multi-modal transportation facilities including streets and highways, railways and guideways, airports, and harbors and ports. Engineering, social and economic evaluation of alternative design schemes for case studies and existing transportation facilities.
RESTRICTIONS: Requires permission of instructor.

CIEG 653  ROADWAY GEOMETRIC DESIGN  3

Physical dimensions of roadways such as vertical and horizontal curvatures, superelevation rates, lane widths, cross sections, and grades. Topics include roadway functions, design controls and criteria, elements of design, local roads and streets, collector roads and streets, rural and urban arterials, freeways, intersections, and grade separations.

CIEG 654  URBAN TRANSPORTATION PLANNING  3

Characteristics of urban travel demand, travel demand forecasting models, urban transportation modes and their characteristics, urban transportation planning processes and issues, evaluation of plans, economic analysis, transportation financing, transportation policy and regulations, and urban transportation systems management.
RESTRICTIONS: Requires permission of instructor.
CIEG 655 CIVIL INFRASTRUCTURE SYSTEMS 3
Presents unified approach to management of civil infrastructure systems. Topics include analytical methods, development of data collection technologies, life cycle cost, prioritization, and optimization. Software tools for infrastructure management decision making introduced and critical infrastructure protection addressed. Types of infrastructure considered include pavements (roads and airports), bridges, drainage and sewer systems, water supply systems, and power supply facilities.

CIEG 656 REGIONAL ANALYSIS METHODS 3
Analysis of land-use and transportation issues in modern society. Focus on relationships between existing, planned and proposed transportation systems; forecast population and employment distributions. Applications and modeling aspects of these relationships using the latest computer software programs.

CIEG 657 CONTEMPORARY TOPICS IN TRANSPORTATION 3
Expose engineering students to some of the planning and policy aspects, and planning and policy students to some of the engineering aspects of transportation. Topics include transportation and safety, transportation and environment, transportation and sustainability, transportation and energy, transportation and economy, transportation and human health, as well as other contemporary topics.

CIEG 658 PAVEMENT ANALYSIS AND DESIGN 3
Presents both flexible and rigid pavement design procedures, as well as detailed descriptions of various inputs used in the mechanistic pavement design procedures. PREREQ: CIEG351.

CIEG 659 OPTIMAL DESIGN 3
Introduction to optimization techniques and software based solutions for linear and non-linear problems related to engineering design. Develop designs for engineering systems and understand how optimization plays a role. PREREQ: Linear algebra.

CIEG 661 INTRODUCTION TO OCEAN MODELING 3
Introduction to numerical methods used to solve the equations of ocean motion. Topics range from basic numerical concepts with applications to general transport and shallow-water equations to an overview of turbulence and ocean circulation models that are employed to understand weather and climate. Crosslisted with MAST661. PREREQ: CIEG639, or permission from instructor.

CIEG 663 TRAFFIC ENGINEERING AND MODELING 3
Introduction to technical aspects of traffic engineering as applied in everyday projects. Students will explore traffic engineering concepts through practical applications, including the use of software packages such as HCS, Synchro, and VISSIM. Software “black box” will be opened to provide each student the ability to diagnose transportation issues and think critically about analysis results. Students will obtain working knowledge of traffic engineering concepts, theories, and methods needed to execute real-word traffic engineering tasks. PREREQ: CIEG351.

CIEG 668 PRINCIPLES OF WATER QUALITY CRITERIA 3
Toxicological and chemical background and technical basis necessary for understanding the models of water and sediment quality criteria for individual and mixtures of organic chemicals and metals that focus on bioavailability; narciss models of toxicity, complication models applied to both the water column and sediments. PREREQ: CHEM 104 (or 103) or permission of instructor.

CIEG 670 PHYSICS OF COHESIVE SEDIMENT 3
Mechanics of fine sediment transport processes in coastal environment; overview of sediment source to sink; bottom boundary layer; mechanics of transport; mixture theory; flocculation; settling and deposition, turbulence-sediment interactions; rheological effects; consolidation and bed erosion/ fluid mud; convective sedimentation; tidal flats. PREREQ: CIEG 305 Fluid Mechanics; MATH 351 Engineering Math I (or equivalent). COREQ: CIEG 639 Ocean Fluid Dynamics (or equivalent).

CIEG 672 WATER WAVE MECHANICS 3
Primary emphasis on linear water wave theory and its applications. Shoaling, refraction and diffraction of waves. Basic aspects of wave-structure and wave-bottom interaction. Introduction to basic wave propagation models. May be crosslisted with MAST648. PREREQ: CIEG305.

CIEG 675 MATLAB FOR ENGINEERING ANALYSIS 3
Description and usage of commercial Matrix Laboratory (Matlab) software for analyzing multi-dimensional engineering data sets and formulating numerical models of engineering processes.

CIEG 678 TRANSPORT AND MIXING PROCESSES 3
Application of fluid mechanics to problems of turbulent mixing and transport of substances in the natural environments; Advection-diffusion processes; Introduction to turbulent flow; Turbulent flow simulation and modeling, Mixing in stratified flow; Mixture and multi-phase flows. Turbulence modulation. Applications to rivers and coastal waters. Numerical model applications. PREREQ: CIEG639 or similar.

CIEG 679 SEDIMENT TRANSPORT MECHANICS 3
Mechanics and mathematical modeling of sediment transport in unidirectional and oscillatory flow; sediment properties, initiation of sediment movement, bedload and suspended load transport rates, formation of bed forms and flow resistance, erosion and deposition in the vicinity of structures, and practical applications. PREREQ: CIEG305

CIEG 680 LITTORAL PROCESSES 3
Coastal morphology, equilibrium beach profiles, onshore-offshore response, sediment transport relationships, sand budgets around inlets and along open coasts, modeling of shoreline response, analyses of beach problems and recommendations of remedial measures.

CIEG 681 WATER WAVE SPECTRA 3
Concepts of amplitude and energy spectra, covariances and cross-spectra; linear response functions; use of the Fast Fourier Transform for ocean engineering applications including analysis of one-dimensional and directional spectra, probability of ocean waves and wave forces. RESTRICTIONS: Requires permission of instructor.

CIEG 682 NEARSHORE HYDRODYNAMICS 3
The mechanics of waves and currents in the nearshore zone: wave breaking, surf zone dynamics, cross- and long-shore currents, turbulence and bottom boundary layers, infra-gravity and edge waves and nearshore modeling. PREREQ: CIEG672 and CIEG639.

CIEG 684 NUMERICAL METHODS FOR COASTAL MODELING 3
Principles of finite difference, finite volume and finite element approaches for basic parabolic, hyperbolic and elliptic partial differential equations. Stability and conservation properties of basic schemes. Coastal engineering applications for surface waves, nearshore circulation, sediment transport and morphology. Introduction to popular models in each area. PREREQ: CIEG672 and CIEG639.

CIEG 686 ENGINEERING PROJECT MANAGEMENT 3
Understand the principles of planning, controlling, and evaluating engineering projects. Learn the use of tools and techniques and practice there use on a personal project. Topics include project organization, project budgeting and scheduling, resource allocation and leveling, change control, and communications. RESTRICTIONS: CIEG686 is only open to Civil Engineering Majors and Minors ONLY.

CIEG 693 WAVES IN THE MARINE ENVIRONMENT 3
General principles of wave mechanics, kinematics and dynamics. Applications to surface gravity waves, acoustic waves, electromagnetic waves and large scale geophysical waves. Crosslisted with MAST693. PREREQ: MEEG690

CIEG 698 GROUNDWATER FLOW AND CONTAMINANT TRANSPORT 3
Development and application of models for fluid flow and contaminant transport in porous media. Derivation of governing equations, analytical and numerical solutions, and application to the movement of groundwater and transport of contaminants at an actual field site. PREREQ: CIEG305 and MATH302 or MATH351, or permission of instructor.

CIEG 801 ADVANCED TOPICS IN FINITE ELEMENT ANALYSIS 3
Review of elementary aspects of the finite element method. Application of the method to linear and nonlinear one-, two- and three-dimensional problems in applied mechanics. Basic and advanced numerical methods and computer programming techniques appropriate to finite element analyses (includes two to three computational laboratory classes). PREREQ: CIEG401

CIEG 802 ADVANCED STEEL DESIGN 3
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.
<table>
<thead>
<tr>
<th>Department</th>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIEG</td>
<td>CIEG 811</td>
<td>ADVANCED STRUCTURAL DYNAMICS DESIGN</td>
<td>3</td>
<td>Linear and nonlinear dynamic analysis of multiple degree of freedom systems subjected to earthquake, wind and impact loadings; the use of analysis results in design. Computer analysis of complex structural systems; distributed, consistent and lumped mass models; wave propagation; random excitations; and structural control.</td>
<td>PREREQ: CIEG611</td>
</tr>
<tr>
<td>CIEG</td>
<td>CIEG 817</td>
<td>STABILITY OF STRUCTURES</td>
<td>3</td>
<td>Structural instability phenomena caused by static and dynamic loads. Stability analyses of structures by equilibrium, energy and dynamic methods. Conservative and non-conservative problems. Elastic and non-elastic buckling of beams, frames and arches caused by mechanical and thermal loads. Buckling of continuously supported beams, plates, and shells. Delamination buckling in composites.</td>
<td>PREREQ: CIEG212 and MATH302 or MATH351.</td>
</tr>
<tr>
<td>CIEG</td>
<td>CIEG 820</td>
<td>INELASTIC BEHAVIOR OF GEOMATERIALS</td>
<td>3</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>
<td>PREREQ: CIEG320. RESTRICTIONS: CIEG620 is highly recommended as a prerequisite.</td>
</tr>
<tr>
<td>CIEG</td>
<td>CIEG 832</td>
<td>THEORY OF WASTEWATER TREATMENT</td>
<td>3</td>
<td>Composition of wastes; physical, chemical and biological methods of wastewater treatment; treatment and disposal of sludges produced at wastewater treatment plants.</td>
<td>PREREQ: CIEG636.</td>
</tr>
<tr>
<td>CIEG</td>
<td>CIEG 865</td>
<td>CIVIL ENGINEERING SEMINAR</td>
<td>0 PF</td>
<td>Graduate seminar covering current topics in structural, environmental, ocean and transportation engineering.</td>
<td></td>
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<tr>
<td>CIEG</td>
<td>CIEG 868</td>
<td>RESEARCH</td>
<td>1-6</td>
<td>An independent investigation under supervision of a member of the civil engineering graduate faculty.</td>
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</tr>
<tr>
<td>CIEG</td>
<td>CIEG 869</td>
<td>MASTER’S THESIS</td>
<td>1-6</td>
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<tr>
<td>CIEG</td>
<td>CIEG 870</td>
<td>OFFSHORE DESIGN</td>
<td>3</td>
<td>Naval hydrodynamics, behavior of submerged and floating bodies, and ship waves. Tsunamis and harbor response.</td>
<td>PREREQ: CIEG672 and CIEG639.</td>
</tr>
<tr>
<td>CIEG</td>
<td>CIEG 871</td>
<td>COASTAL STRUCTURES</td>
<td>3</td>
<td>Advanced design procedures of coastal structures. Includes statistics and spectra of random sea waves, random sea transformation in the nearshore, design of vertical and rubble mound breakwaters, harbor oscillations and tranquility, and hydraulic model tests.</td>
<td></td>
</tr>
<tr>
<td>CIEG</td>
<td>CIEG 872</td>
<td>ADVANCED WATER WAVE MECHANICS</td>
<td>3</td>
<td>Development of finite amplitude wave theories such as solitary, conoidal stokes and stream function. Application to coastal and ocean engineering problems.</td>
<td>PREREQ: CIEG639, CIEG672.</td>
</tr>
<tr>
<td>CIEG</td>
<td>CIEG 964</td>
<td>PRE-CANDIDACY STUDY</td>
<td>3-12 PF</td>
<td>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.</td>
<td>RESTRICTIONS: Not open to students who have been admitted to candidacy.</td>
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<tr>
<td>CIEG</td>
<td>CIEG 969</td>
<td>DOCTORAL DISSERTATION</td>
<td>1-12 PF</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
<td>Description</td>
<td>PREREQ:</td>
<td>RESTRICTIONS</td>
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<tr>
<td>CISC 304</td>
<td>LOGIC AND PROGRAMMING</td>
<td>3</td>
<td>Propositional and predicate logic for general reasoning and advanced applications in knowledge representation in artificial intelligence and database, program correctness and programming semantics. Models, resolution, logic programming, and natural deduction.</td>
<td>CISC220, MATH210 (with minimum C- grade in both).</td>
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<tr>
<td>CISC 320</td>
<td>INTRODUCTION TO ALGORITHMS</td>
<td>3</td>
<td>Design and analysis of algorithms: worst/average case analysis, proofs for correctness and performance of algorithms. Algorithmic strategies (divide and conquer, greedy methods, dynamic programming, etc.). Algorithms for searching, forming and traversal of strings, trees and graphs. Categorization of computational problems: classes P and NP. NP completeness.</td>
<td></td>
<td>PREREQ: CISC304. RESTRICTIONS: Credit cannot be received for both CISC404 and CISC604.</td>
</tr>
<tr>
<td>CISC 355</td>
<td>COMPUTERS, ETHICS AND SOCIETY</td>
<td>3</td>
<td>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.</td>
<td></td>
<td>RESTRICTIONS: Cannot be used as a technical elective for CISC or INSY majors or minors.</td>
</tr>
<tr>
<td>CISC 356</td>
<td>INTELLECTUAL PROPERTY IN THE DIGITAL AGE</td>
<td>3</td>
<td>Explore economic, philosophical, social, and technical approaches to intellectual property (1500 BCE to present) then will research contemporary IP issues in software, entertainment, the Internet, and biotechnology.</td>
<td></td>
<td>RESTRICTIONS: Junior or Senior standing. Cannot be used as a technical elective for CISC or INSY majors or minors.</td>
</tr>
<tr>
<td>CISC 357</td>
<td>FIELD EXPERIENCES IN TEACHING COMPUTING</td>
<td>1-3</td>
<td>Introduction to computer science teaching methodology which is immediately put into practice in local schools. Lectures hone teaching and classroom skills while examining the state of CS education in terms of pedagogy, AP exams, and K-12 requirements. Students produce written lesson plans, journals, and collaborative projects.</td>
<td></td>
<td>PREREQ: CISC101 or CISC103 or CISC104 or CISC108. RESTRICTIONS: Student must have sufficient time in their schedule to visit schools weekly between 9am and 3pm. Students must pass a background check that clears them for teaching. Cannot be used as a technical elective by CISC or INSY majors.</td>
</tr>
<tr>
<td>CISC 360</td>
<td>COMPUTER ARCHITECTURE</td>
<td>3</td>
<td>Principles and techniques used in the architecture of digital computers. Machine elements and their interrelation. Instruction sets, risc vs cisc, registers, busses and switches.</td>
<td></td>
<td>PREREQ: A minimum grade of C- in CISC220 and CISC260 (or equivalent courses).</td>
</tr>
<tr>
<td>CISC 361</td>
<td>OPERATING SYSTEMS</td>
<td>3</td>
<td>Principles and techniques employed in the development of operating systems and their control programs. Includes management of memory, processors, I/O devices.</td>
<td></td>
<td>PREREQ: A minimum grade of C- in both CISC220 and CISC260. CPEG222 may be substituted for CISC360. RESTRICTIONS: CISC360 recommended as a prerequisite.</td>
</tr>
<tr>
<td>CISC 364</td>
<td>SYSTEM SECURITY</td>
<td>3</td>
<td>Concepts in maintaining a secure network of computers connected to the Internet. Topics include information security, classic/common exploits of operating system and networking weaknesses (e.g., buffer overflows, denial of service) and how to prevent them, symmetric and public-key cryptography, digital signatures, wireless LAN security, and firewalls.</td>
<td></td>
<td>PREREQ: CISC361.</td>
</tr>
<tr>
<td>CISC 366</td>
<td>INDEPENDENT STUDY</td>
<td>1-6</td>
<td>Introduction to parallel computing concepts, methodologies, and tools. Programming and algorithmic techniques for code that will run simultaneously on parallel computing architectures. Topics include: single and multi-core parallelism, shared and distributed memory architectures, concurrency, program decomposition, data distribution, communication, load balancing, scalability, locality, granularity, debugging, performance evaluation.</td>
<td></td>
<td>PREREQ: CISC220, CISC260.</td>
</tr>
<tr>
<td>CISC 372</td>
<td>PARALLEL COMPUTING</td>
<td>3</td>
<td>Experience the software engineering process through creating educational games for youth; open-ended, project-oriented team learning while assisting regional teachers in integrating computing and computational thinking into the classroom; interact with teachers as clients, hone communication skills and experience design-studio-based critiques of your ideas.</td>
<td></td>
<td>PREREQ: CISC 220.</td>
</tr>
<tr>
<td>CISC 374</td>
<td>EDUCATIONAL GAME DEVELOPMENT</td>
<td>3</td>
<td>General models of computation, formal languages and automata theory and algorithmic unsolvability.</td>
<td></td>
<td>PREREQ: CISC303 RESTRICTIONS: Credit cannot be received for both CISC401 and CISC601.</td>
</tr>
<tr>
<td>CISC 404</td>
<td>LOGIC IN COMPUTER SCIENCE</td>
<td>3</td>
<td>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.</td>
<td></td>
<td>PREREQ: CISC304. RESTRICTIONS: Credit cannot be received for both CISC404 and CISC604.</td>
</tr>
<tr>
<td>CISC 409</td>
<td>TOPICS IN THEORETICAL COMPUTER SCIENCE</td>
<td>3</td>
<td>Contents vary to coincide with the interests of students and current faculty.</td>
<td></td>
<td>PREREQ: CISC401 RESTRICTIONS: Credit cannot be received for both CISC409 and CISC609.</td>
</tr>
<tr>
<td>CISC 410</td>
<td>COMPUTATIONAL MATHEMATICS I</td>
<td>3</td>
<td>Floating point numbers; conditioning and stability; LU, Cholesky, and QR factorizations; square and overdetermined linear systems; Newton and quasi-Newton rootfinding methods; piecewise polynomials for interpolation, integration, and finite differences; explicit methods for initial-value problems. Prerequisites: MATH 305, MATH 349, or MATH 351. Students may not receive credit for both MATH 353 and MATH 426. Crosslisted with MATH426. PREREQ: MATH305 or MATH351 or MATH349. RESTRICTIONS: Requires familiarity with computing (e.g., programming language).</td>
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<tr>
<td>CISC 411</td>
<td>COMPUTATIONAL MATHEMATICS II</td>
<td>3</td>
<td>Eigenvalue and singular-value decompositions; power and Krylov subspace iterations; global interpolation and quadrature; methods for boundary-value problems and Poisson’s equation; implicit solvers for stiff problems; method of lines for partial differential equations; diffusion and advection problems. Crosslisted with MATH428. PREREQ: MATH426 or CISC410 or MATH533.</td>
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<tr>
<td>CISC 414</td>
<td>FORMAL METHODS IN SOFTWARE ENGINEERING</td>
<td>3</td>
<td>Formal approaches to the specification, verification, and design of software systems. Topics include representing programs as transition systems; liveness and safety properties; state space reachability; explicit, symbolic and automata-based model checking; temporal logic; symbolic execution; automated theorem-proving; and relational calculus. Learn to use state-of-the-art tools based on these methods, such as the model checker Spin.</td>
<td></td>
<td>PREREQ: CISC304 or equivalent course, or permission of instructor. RESTRICTIONS: Credit cannot be received for both CISC614/CPEG614 and CISC414.</td>
</tr>
<tr>
<td>CISC 429</td>
<td>TOPICS IN ALGORITHMS AND COMPLEXITY THEORY</td>
<td>3</td>
<td>Contents vary to coincide with the interests of students and current faculty.</td>
<td></td>
<td>RESTRICTIONS: Credit cannot be received for both CISC429 and CISC629.</td>
</tr>
<tr>
<td>CISC 436</td>
<td>COMPUTATIONAL BIOLOGY AND BIOINFORMATICS</td>
<td>3</td>
<td>Concepts, methodologies, and tools in bioinformatics. Abstraction of biological problems for computational solutions. Genome sequencing and assembly, bio-sequence analysis and comparison and database search, dynamics programming, hidden Markov models, and phylogenetic trees.</td>
<td></td>
<td>PREREQ: CISC220 or permission of instructor.</td>
</tr>
<tr>
<td>CISC 437</td>
<td>DATABASE SYSTEMS</td>
<td>3</td>
<td>Physical and logical organization of databases. Data retrieval languages, relational database languages, security and integrity, concurrency, distributed databases.</td>
<td></td>
<td>RESTRICTIONS: Credit cannot be received for both CISC437 and CISC637.</td>
</tr>
<tr>
<td>CISC 440</td>
<td>COMPUTER GRAPHICS</td>
<td>3</td>
<td>Computer graphics technology, two- and three-dimensional systems, graphics software systems, modeling and object hierarchy, and animation.</td>
<td></td>
<td>PREREQ: CISC220 and MATH241 RESTRICTIONS: CISC320 recommended. Credit cannot be received for both CISC440 and CISC640.</td>
</tr>
<tr>
<td>CISC 442</td>
<td>INTRODUCTION TO COMPUTER VISION</td>
<td>3</td>
<td>Analysis of images and video to recognize, reconstruct, model, and otherwise infer static and dynamic properties of objects in the three-dimensional world. Geometry of image formation; image processing such as smoothing, edge and feature detection, color, and texture; segmentation; shape representation including deformable templates; stereo vision; motion estimation and tracking; techniques for 3-D reconstruction; image registration methods.</td>
<td></td>
<td>PREREQ: CISC220. RESTRICTIONS: Credit cannot be received for both CISC442 and CISC642.</td>
</tr>
<tr>
<td>CISC 449</td>
<td>TOPICS IN COMPUTER APPLICATIONS</td>
<td>3</td>
<td>Contents will vary to coincide with the interests of students and current faculty.</td>
<td></td>
<td>RESTRICTIONS: Credit cannot be received for both CISC449 and CISC649.</td>
</tr>
</tbody>
</table>
CISC 450 COMPUTER NETWORKS I 3
Foundation principles, architectures and techniques employed in computer and communication networks. Focuses on mechanisms used in TCP/IP protocol suite. Topics include connection management, end-to-end reliable data transfer, sliding window protocols, quality of service, flow control, congestion control, routing, LANs, framing, error control, analog versus digital transmission, packet versus circuit switching, multiplexing.
May be crosslisted with CPE419. PREREQ: CISC260 or CPG222. RESTRICTIONS: Knowledge of probability and statistics recommended. Credit cannot be received for both CISC450 and any of the following courses: CISC250, CPE419, CISC650, ELEC651.

CISC 451 DATA COMPRESSION IN MULTIMEDIA 3
PREREQ: CISC220, MATH210, MATH241, and either MATH205 or MATH350.

CISC 453 SIMULATION OF COMPUTER NETWORKS 3
Modeling and computer simulation of discrete systems using discrete event simulation techniques. Application to the performance evaluation and modeling of computer networks and networking protocols. Study and use of simulation systems such as OPNET, Qualnet, and ns2.
PREREQ: CISC450, or equivalent.

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

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

CISC 465 INTRODUCTION TO CYBERSECURITY 3
This cybersecurity course is an introduction to computer and network security and covers the foundational security policies and methods to provide confidentiality, integrity, and availability, as well as cryptography, auditing, and user security. Topics are reinforced with hands-on exercises run in a virtual machine environment.
Crosslisted with CPEG465.

CISC 466 INDEPENDENT STUDY 1-6
Selection, use and implementation of appropriate language(s) for given problems. Syntax, semantics, pragmatics, parameter passing, abstract data types and comparisons between languages.
PREREQ: CISC275 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 CISC303

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

CISC 474 ADVANCED WEB TECHNOLOGIES 3
Programming and architecture of web servers and the technologies for implementing high performance, sophisticated web sites for applications like e-commerce. Students learn how to install and set-up a web server, how to write and install programs for a web server, and how to design and implement multi-tier client/server applications with database backends.
PREREQ: CISC275 COREQ: CISC437 CISC637

CISC 475 ADVANCED SOFTWARE ENGINEERING 3
Understand and apply a complete modern software engineering process. Topics include requirements analysis, specification, design, implementation, verification, and project management. Real-life team projects cover all aspects of the software development lifecycle, from the requirements to acceptance testing.
PREREQ: CISC275. CISC361 is recommended. RESTRICTIONS: Senior status. Credit cannot be received for both CISC475 and CISC675.

CISC 477 SYSTEMS ADMINISTRATION 3
Introduces students to the internals of UNIX, trouble-shooting system and network problems, hardware and software configuration and installation, and security aspects of hosts on the Internet. Multi-operating system integration will also be discussed.
PREREQ: CISC631

CISC 479 TOPICS IN ARCHITECTURE AND SOFTWARE 3-6
Contents will vary to coincide with the interests of students and faculty.
PREREQ: CISC479. RESTRICTIONS: Credit cannot be received for both CISC479 and CISC679.

CISC 481 ARTIFICIAL INTELLIGENCE 3
Programming techniques for problems not amenable to algorithmic solutions. Problem formulation, search strategies, state spaces, applications of logic, knowledge representation, planning and application areas.
May be crosslisted with CGSC481. PREREQ: CISC220 with a minimum grade of C-. CISC394. RESTRICTIONS: Credit cannot be received for both CISC481 and CISC681.

CISC 483 INTRODUCTION TO DATA MINING 3
Concepts, techniques, and algorithms for mining large data sets to discover structural patterns that can be used to make subsequent predictions. Emphasis on practical approaches and empirical evaluation. Use of a workbench of data mining tools, such as the Weka toolkit.
PREREQ: CISC275, or permission of instructor.

CISC 484 INTRODUCTION TO MACHINE LEARNING 3
Development of methods to learn to solve a task using examples. Explore different machine learning algorithms/techniques and discuss their strengths and weaknesses and situations they are or are not suited for.
PREREQ: CISC220 and MATH210, or permission of instructor. RESTRICTIONS: Credit cannot be received for both CISC484 and CISC684.

CISC 489 TOPICS: ARTIFICIAL INTELLIGENCE 3
Contents vary to coincide with the interests of students and current faculty.
PREREQ: CISC481 or CISC681. RESTRICTIONS: Credit cannot be received for both CISC489 and CISC689.

CISC 601 ELEMENTS OF THE THEORY OF COMPUTATION 4
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 604 LOGIC IN COMPUTER SCIENCE 3
Formal introduction to first-order logic with emphasis on its relevance to computer science. Syntax, semantics, models, formal proofs and results on soundness, consistency, completeness, compactness and undecidability. Automated theorem proving also covered.
PREREQ: CISC304 equivalent. RESTRICTIONS: Credit cannot be received for both CISC604 and CISC404.

CISC 609 TOPICS IN THEORETICAL COMPUTER SCIENCE 3-12
Contents vary to coincide with the interests of students and current faculty.
PREREQ: CISC601 RESTRICTIONS: Credit cannot be received for both CISC609 and CISC609.

CISC 611 SOFTWARE PROCESS MANAGEMENT 3
Software management studies processes and concepts for planning and monitoring all software life-cycle phases. Topics include management models and structures, project planning including scheduling, effort estimation and risk management, project personnel and organization, project control (monitoring, measurement, correction and performance standards), software configuration management, and process description languages and tools.
May be crosslisted with CPEG611.

CISC 612 SOFTWARE DESIGN 3
Key software design concepts are introduced. Topics include basic design concepts, principles of good design, design strategies, software architecture and styles of architectural design, and design and architectural notations and languages. Detailed design, including design patterns and component design are also covered. Implementation issues that affect the design, including design support tools and tools for analyzing designs are discussed.
May be crosslisted with CPEG612.

CISC 613 SOFTWARE REQUIREMENTS ENGINEERING 3
Rigorous methods to elicit, analyze, and specify the requirements of a software system. The tasks range from identifying stakeholders and their goals producing a precise software specification document. Topics may include data flow diagrams, use cases, UML sequence and collaboration diagrams, finite state machines, requirements for real-time and concurrent systems, entity-relationship diagrams, and logic-based specifications, as well as the analysis of specifications for consistency and completeness.
May be crosslisted with CPEG613.
CISC 614 FORMAL METHODS IN SOFTWARE ENGINEERING 3
Formal approaches to the specification, verification, and design of software systems. Topics include representing programs as transition systems; liveness and safety properties; state space reachability; explicit, symbolic and automata-based model checking; temporal logic; abstract interpretation; automated theorem proving; and relational calculus. Learn to use state-of-the-art tools based on these methods, such as the model checker Spin. May be crosslisted with CPEG614. RESTRICTIONS: Credit cannot be received for both CISC614 and CISC414.

CISC 615 SOFTWARE TESTING AND MAINTENANCE 3
Study of software testing and maintenance methodologies for modern software. Topics include approaches to automatic test case generation, test oracles, test coverage analysis, regression testing, program understanding, and software maintenance tools. A primary focus will be automation in software testing and maintenance approaches. May be crosslisted with CPEG615.

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

CISC 636 COMPUTATIONAL BIOLOGY AND BIOINFORMATICS 3
Concepts, methodologies, and tools in bioinformatics. Abstraction of biological problems for computational solutions. Genome sequencing and assembly, biosequence analysis and comparison and database search, dynamics programming, hidden Markov models, and phylogenetic trees.
PREREQ: CISC220 or permission of instructor. RESTRICTIONS: Credit can not be earned for both CISC636 and CISC436.

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

CISC 640 COMPUTER GRAPHICS 3
Computer graphics technology, two- and three-dimensional systems, graphics software systems, modeling and object hierarchy, and animation.
PREREQ: CISC220 or equivalent. COREQ: CISC320 recommended. RESTRICTIONS: Credit cannot be received for both CISC640 and CISC440.

CISC 642 INTRODUCTION TO COMPUTER VISION 3
An introduction to the analysis of images and video in order to recognize, reconstruct, model, and otherwise infer static and dynamic properties of objects in the three-dimensional world. Studies the geometry of image formation; basic concepts in image processing such as smoothing, edge and feature detection, color, and texture; segmentation; shape representation including deformable templates; stereo vision; motion estimation and tracking; techniques for 3-D reconstruction; image registration methods.
PREREQ: CISC220 equivalent. RESTRICTIONS: Credit cannot be received for both CISC 442 and CISC 442.

CISC 649 TOPICS IN COMPUTER APPLICATIONS 3-12
Contents vary to coincide with the interests of students and current faculty.
RESTRICTIONS: Credit cannot be received for both CISC649 and CISC449.

CISC 650 COMPUTER NETWORKS II 3
Foundation principles, architectures, and techniques employed in computer and communication networks. Focuses on mechanisms used in TCP/IP protocol suite. Topics include connection management, end-to-end reliable data transfer, sliding window protocols, quality of service, flow control, congestion control, routing, LANs, framing, error control, analog versus digital transmission, packet versus circuit switching, multiplexing. May be crosslisted with CPEG651, ELEG651. PREREQ: An undergraduate level course in computer architecture and operating systems. RESTRICTIONS: Credit cannot be received for CISC650 and any of the following courses: CISC250, CPEG419, CISC450, ELEG651.

CISC 651 DATA COMPRESSION IN MULTIMEDIA 3
Important approaches to data and multimedia compression. Lossless techniques: Huffman, dictionary, arithmetic, run length, Lossless applications: GIF, lossless JPEG, Unix compress, facsimile. Lossy techniques: scalar/vector quantization, differential/subband/transform/wavelet encoding. Lossy applications: JPEG, JPEG2000, MPEG, MP3. PREREQ: CISC220, MATH210, MATH241, MATH205, or equivalent. RESTRICTIONS: Credit cannot be received for both CISC651 and CISC451.

CISC 653 SIMULATION OF COMPUTER NETWORKS 3
Modeling and computer simulation of discrete systems using discrete event simulation techniques. Application to the performance evaluation and modeling of computer networks and networking protocols. Study and use of simulation systems such as OPNET, Qualnet, and ns-2. PREREQ: CISC450 or CISC650. RESTRICTIONS: Credit cannot be received for both CISC653 and CISC453.

CISC 659 TOPICS IN COMMUNICATIONS, DISTRIBUTED COMPUTING AND NETWORKS 3
Contents vary to coincide with the interests of students and faculty.
PREREQ: CISC650 RESTRICTIONS: Credit cannot be received for both CISC659 and CISC469.

CISC 662 COMPUTER SYSTEMS: ARCHITECTURE 3
Recent advances in computer architecture and their impact on architectural design. Multicompiler and multiprocessor architectures. Parallel machines.
PREREQ: CISC360 or equivalent RESTRICTIONS: Credit cannot be received for both CISC662 and CISC462.

CISC 663 OPERATING SYSTEMS 3
Comparison and analysis of strategies for the management of memory, processors, I/O devices and file systems.
PREREQ: CISC260 or equivalent

CISC 664 INTRODUCTION TO NETWORK SECURITY 3
Detailed, in-depth overview of pressing network security problems and discusses potential solutions. Covers a broad variety of security topics, such as cryptography, authentication, denial-of-service attacks, worms, viruses, etc. Lecture and optional reading provide background information on the key network security concepts, and course projects create opportunity to exercise concepts learned in class.
PREREQ: CISC450 or CISC650. RESTRICTIONS: Credit cannot be received for both CISC664 and CISC464.

CISC 665 INTRODUCTION TO CYBERSECURITY 3
Introduction to computer and network security and covers the foundation security policies and methods to provide confidentiality, integrity, and availability, as well as cryptography, auditing, and user security. Topics are reinforced with hands-on exercises run in a virtual machine environment. Crosslisted with CPEG665.

CISC 666 SPECIAL PROBLEM 1-12

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: CISC303 or equivalent. RESTRICTIONS: Credit cannot be received for both CISC670 and CISC470.

CISC 672 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: CISC220 or equivalent, and CISC601 recommended. RESTRICTIONS: Undergraduates must obtain instructor's permission. Credit cannot be received for both CISC672 and CISC471.

CISC 673 PROGRAM ANALYSIS AND TRANSFORMATION 3
Analysis and transformation of software with applications to code optimization and software engineering. Topics include control flow analysis, advanced program representations, intra-procedural and interprocedural data flow analysis, and code-improving transformations.
PREREQ: CISC672, or permission of instructor.

CISC 675 SOFTWARE ENGINEERING PRINCIPLES AND PRACTICES 3
Understand and apply a complete modern software engineering process. Topics include requirements analysis, specification, design, implementation, verification, and project management. Real-life team projects cover all aspects of software development lifecycle, from requirements to acceptance testing. Use of formal methods in the specification, design, and verification of software will be explored.
PREREQ: By permission of instructor only. RESTRICTIONS: Credit cannot be received for both CISC475 and CISC675.

CISC 681 ARTIFICIAL INTELLIGENCE 3
Programming techniques for problems not amenable to algorithmic solutions. Problem formulation, search strategies, state spaces, applications of logic, knowledge representation, planning and application areas.
May be crosslisted with CGSC681. PREREQ: CISC220 and CISC304 or equivalent. RESTRICTIONS: Credit cannot be received for both CISC681 and CISC481.
CISC 683  INTRODUCTION TO DATA MINING  3
Concepts, techniques, and algorithms for mining large data sets to discover structural patterns that can be used to make subsequent predictions. Emphasis on practical approaches and empirical evaluation. Use of a workbench of data mining tools, such as the Weka toolkit.
RESTRICTIONS: Credit cannot be received for both CISC683 and CISC483.

CISC 684  INTRODUCTION TO MACHINE LEARNING  3
Development of methods to learn to solve a task using examples. Explore different machine learning algorithms/techniques and discuss their strengths and weaknesses and situations they are or are not suited for.
May be crosslisted with BINF684. PREREQ: Basic background in probability and statistics.
RESTRICTIONS: Credit cannot be received for both CISC484 and CISC884.

CISC 689  TOPICS: ARTIFICIAL INTELLIGENCE  3-12
Contents vary to coincide with the interests of students and faculty. Crosslisted with BINF689. PREREQ: CISC681. RESTRICTIONS: Credit cannot be received for both CISC689 and CISC489.

CISC 691  SOFTWARE ENGINEERING PRACTICUM  3
Technical practicum guided by the individual student's interests. The student will contribute a significant software engineering project either on campus or in association with an off-campus private business or government agency. Must be arranged with, and approved in advance by, a CIS or ECE faculty member.
May be crosslisted with CPE691.

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

CISC 801  ADVANCED COMPUTABILITY THEORY  3
Advanced abstract computability (or recursive function) theory with emphasis on 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  COMPUTABILITY THEORETICAL LEARNING  3
Mathematically circumscribes the absolute boundaries of what algorithms can do about learning grammars for languages and programs for functions. Proves results in the recursion-theoretic theory of machine learning. Provides interpretations of results regarding human language learning and philosophy of science.
PREREQ: CISC601.

CISC 809  ADVANCED TOPICS IN THEORETICAL COMPUTER SCIENCE  3-12
Contents vary to coincide with the interests of students and faculty.
PREREQ: CISC601.

CISC 822  ALGEBRAIC ALGORITHMS  3
PREREQ: CISC621 and/or an abstract algebra course or permission of instructor
RESTRICTIONS: Offered in alternate years.

CISC 829  ADVANCED TOPICS IN ALGORITHMS AND COMPLEXITY THEORY  3-12
Contents vary to coincide with the interests of students and faculty.

CISC 841  ALGORITHMS IN BIOINFORMATICS  3
Advanced topics in current bioinformatics research, such as hidden Markov models, kernel based methods, and bayesian based algorithms with applications to functional annotation, structural prediction, and biological networks inference.
PREREQ: CISC436 or CISC368 or permission of instructor.

CISC 844  COMPUTATIONAL BIOMEDICINE  3
Survey methods and approaches in algorithms, statistics and machine learning, along with their current applications in bio- and medical- informatics. May be crosslisted with BME584. RESTRICTIONS: Should have some background in basic probability and statistics, and background in computing algorithms.
For students outside CIS, Biomedical Engineering or Bioinformatics, permission from the instructor.

CISC 849  ADVANCED TOPICS IN COMPUTER APPLICATIONS  3-12
Contents vary to coincide with the interests of students and faculty.
RESTRICTIONS: Requires permission of instructor.

CISC 850  FINANCIAL SERVICES ANALYTICS SEMINAR  3
Concentrated study on selected areas in Financial Services Analytics. Crosslisted with FSAN850. RESTRICTIONS: 6 credits of this class is required in the Financial Services Analytics PhD program.

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

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

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

CISC 859  ADVANCED TOPICS IN COMMUNICATIONS, DISTRIBUTED NETWORKING  3-12
Contents vary to coincide with the interests of students and faculty.
PREREQ: CISC650.

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

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

CISC 866  SPECIAL PROBLEM  1-12

CISC 868  RESEARCH  1-9
Upper-level graduate research oriented toward a student's potential master's thesis or Ph.D. dissertation.

CISC 869  MASTER'S THESIS  1-6

CISC 873  COMPILING FOR ADVANCED ARCHITECTURES  3
Techniques for generating code for advanced uniprocessor and multiprocessor architectures. Topics include register allocation, code generation for pipelined, superscalar, VLIW architectures, dependence analysis, locality transformations, compiling for shared memory, message passing, distributed shared memory and multi-threaded architectures.
PREREQ: CISC662 or previous course in compilers, and CISC662 or previous course in computer architecture. RESTRICTIONS: CISC872 is recommended.

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

CISC 879  ADVANCED TOPICS IN ARCHITECTURE AND SOFTWARE SYSTEMS  3-12
Contents vary to coincide with the interests of students and faculty.
PREREQ: CISC662 or CISC663.

CISC 882  NATURAL LANGUAGE PROCESSING  3
Introduction to computational models of syntax, semantics and pragmatics for natural language understanding. Emphasis on design of English interfaces to data bases and ill-formed input.
PREREQ: CISC681.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CISC 883</td>
<td>NATURAL LANGUAGE GENERATION</td>
<td>3</td>
</tr>
<tr>
<td>CISC 885</td>
<td>DISCOURSE AND DIALOGUE</td>
<td>3</td>
</tr>
<tr>
<td>CISC 886</td>
<td>MULTI-AGENT SYSTEMS</td>
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<tr>
<td>CISC 887</td>
<td>INTERNET INFORMATION GATHERING</td>
<td>3</td>
</tr>
<tr>
<td>CISC 888</td>
<td>MACHINE LEARNING</td>
<td>3</td>
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<tr>
<td>CISC 889</td>
<td>ADVANCED TOPICS IN ARTIFICIAL INTELLIGENCE</td>
<td>3-12</td>
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<tr>
<td>CISC 890</td>
<td>COLLOQUIUM: COMPUTER SCIENCE</td>
<td>0 PF</td>
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<tr>
<td>CISC 964</td>
<td>PRE-CANDIDACY STUDY</td>
<td>3-12 PF</td>
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<tr>
<td>CISC 969</td>
<td>DOCTORAL DISSERTATION</td>
<td>1-12 PF</td>
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**Comparative Literature**

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMLT 207</td>
<td>GREAT WRITERS OF THE WESTERN WORLD I: 1100-1700</td>
<td>3</td>
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<tr>
<td>CMLT 208</td>
<td>GREAT WRITERS OF THE WESTERN WORLD II: 1650-1950</td>
<td>3</td>
</tr>
<tr>
<td>CMLT 217</td>
<td>INTRODUCTION TO FILM</td>
<td>3</td>
</tr>
<tr>
<td>CMLT 218</td>
<td>INTRODUCTION TO DRAMA</td>
<td>3</td>
</tr>
<tr>
<td>CMLT 219</td>
<td>INTRODUCTION TO THE NOVEL</td>
<td>3</td>
</tr>
<tr>
<td>CMLT 311</td>
<td>CLASSICAL MYTHOLOGY: GODS, HEROES, AND MONSTERS</td>
<td>3</td>
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</tbody>
</table>

**CMLT 211**

- Focuses on different techniques of acting, mise-en-scene, cinematography, editing, sound and color to assess how films encourage audiences to respond in the ways they do.
- Crosslisted with ENGL217. PREREQ: ENGL110

**CMLT 218**

- Representative masterworks of the classical era to the present.
- Crosslisted with ENGL208. PREREQ: ENGL110

**CMLT 219**

- Representative masterworks of fiction, emphasizing those of Europe and America.
- Crosslisted with ENGL209. PREREQ: ENGL110

**CMLT 316**

- Cosmological myths and heroic sagas in the literature and art of Greece and Rome. The influence of the mythology in later art and literature.
COMM 200  TOPICS IN COMMUNICATION  3
Rotating topics presenting overviews of social science research on communication in various contexts including the behavior of individuals, relationships, social groups, and media in society. Emphasize theories, empirical findings, and applications of communication research in the social and behavioral sciences. RESTRICTIONS: May be repeated twice for nine credits when topics vary.

COMM 204  GENDER AND COMMUNICATION  3
Deals with gender differences in communication in varied contexts, such as conflict, marriage, family, friendship, and work. May be crosslisted with WOMS204.

COMM 206  SEX, VIOLENCE, AND THE MEDIA  3
Examine the issues surrounding the prevalence of sex and violence in the media. Topics include free speech/press decisions and their impact, why people watch, the possible effects, and the market forces that encourage corporations to carry such content.

COMM 212  ORAL COMMUNICATION IN BUSINESS  3
Includes an analysis of the types and principles of the communication inherent in the business and professional setting; a concentration upon the development of presentational skills: analyzing audiences, questioning, interviewing, researching, supporting, organizing and delivering information; an opportunity to develop and present materials within dyads, small groups and public contexts. RESTRICTIONS: Not open to communication and communication interest majors. Credit not given for both COMM212 AND COMM350.

COMM 227  FAMILY COMMUNICATION  3
Introduces students to the area of family communication. Gain knowledge about basic theories of family communication and learn to apply theories and research to real-world contexts.

COMM 245  MEDIA AND SOCIETY  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 252  COMMUNICATING EFFECTIVELY  1 PF
Designed to teach students the fundamentals of written communication techniques that are used in communication industries, such as broadcast journalism, public relations, and organizational communication.

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

COMM 263  COMMUNICATIVE BEHAVIOR AND CULTURE  3
Communicative processes in other cultures as well as subcultures in the US will be discussed. Students will become more mindful and aware of their own cultural patterns as well. Difficulties in cross cultural communication will also be discussed.

COMM 284  GENDER, CULTURE AND DIGITAL MEDIA  3
Explores the relationship between gender, culture, and digital media. Crosslisted with WOMS284.

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

COMM 305  TOPICS: COMMUNICATION AND POLITICS  3
Topics vary and focus on significant areas of political communication with an emphasis on content, trends, processes, theories, and effects. Topics may include political entertainment, news, political advertising and campaigning, ethics, public opinion, or audience research.

COMM 306  DIGITAL TECHNOLOGY IN POLITICS  3
Focuses on how technology influences and is used in political campaigns, public policy debates, governance, and public opinion, as well as how politics shapes technological development, processes, and policy. Special attention given to synergy among political actors, media, non-governmental organizations and citizens in shaping, consuming, and producing communication technology and policy.

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

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

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

COMM 318  TOPICS IN MEDIA COMMUNICATION  3
Focus on introductory areas of study in mass communication. RESTRICTIONS: May be repeated twice for nine credits when topics vary.

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

COMM 323  TOPICS IN JOURNALISM PRODUCTION  3
Experiential education involving broadcast and production topics. PREREQ: COMM324 or permission of instructor.

COMM 324  ELECTRONIC MEDIA PRODUCTION  3
Foundational concepts and skills to be built upon in subsequent courses in broadcast production/broadcast news sequences. Introduction to program content planning, writing for visual media, studio equipment, field equipment, and non-linear editing. RESTRICTIONS: OPEN TO COMI & COMM Majors or Permission of Instructor. Serves as suggested prerequisite for COMM326, COMM388, and COMM425 (News Documentary).

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

COMM 326  FIELD TELEVISION PRODUCTION  3
Students gain practical knowledge of field television news production and utilize this knowledge to conceptualize, shoot, write, and edit videos, while working on a production deadline. RESTRICTIONS: Suggested prerequisite - COMM324.

COMM 327  PRODUCTION LABORATORY I  1-6 PF
Practice of production techniques. RESTRICTIONS: Permission required from department.

COMM 328  PRODUCTION LABORATORY II  1-6 PF
Further practice of production techniques. RESTRICTIONS: Permission required from department.

COMM 329  BROADCAST NEWSWRITING  3
Emphasizes broadcast newswriting fundamentals and comparisons to other forms of writing. Includes news judgment, news gathering, and news editing, as well as integration of current events. May be crosslisted with JOUR329. RESTRICTIONS: COMM and COMI majors not minoring in JOUR.

COMM 330  COMMUNICATION AND INTERPERSONAL BEHAVIOR  3
Introduces key principles of interpersonal communication and discusses their application across diverse contexts.
COMM 333  SOCIAL MEDIA MANAGEMENT  3  
Explore strategic communication through social media. Experience a highly interactive classroom exploring differences between personal use and marketers’ uses of social media. Students complete multiple digital projects both in-class and out of class. Topics include marketing, public relations, audience analysis, demographics, metrics, digital engagement, interactivity, return-on-investment, scheduling, and digital monitoring through readings, videos, projects and case studies.  

COMM 337  TOPICS IN POLITICAL COMMUNICATION  1  PF  This lecture series focuses on various thematic issues in political communication and campaign politics. May be crosslisted with LEAD337, POSC337, UAPP337. RESTRICTIONS: May be repeated twice for credit.  

COMM 340  POLITICS AND THE MEDIA  3  
Political roles of the media in socialization, political competence, agenda setting, the electoral process and political crises. Emphasis on media-political system interaction and its import in a democratic society. Crosslisted with POSC340. RESTRICTIONS: Open to majors only.  

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

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

COMM 345  LEGAL ISSUES OF THE MASS MEDIA  3  
Survey of legal issues affecting the development and performance of the mass media. The foundation of American communications law outlined through the study of First Amendment theory, its origin and development. Legal issues concerning libel, obscenity, copyright and broadcast regulation discussed. May be crosslisted with INET345.  

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

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

COMM 364  INTERNSHIP  1-3  PF  Practical, on-the-job training in the student’s field of interest: i.e., interpersonal, mass media, public relations or organizational communication. RESTRICTIONS: Offered in spring and fall semesters only. Open to junior and senior communication majors only. May be repeated 2 times for credit.  

COMM 366  INDEPENDENT STUDY  1-3  
COMM 370  THEORIES OF MEDIA 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  VIDEO PRODUCTION PRACTICUM  1-4  
Involves intensive work on specific productions. Includes practice in various aspects of video production: development, direction, management, production, and editing. RESTRICTIONS: Requires permission of instructor. May be repeated for eight credits.  

COMM 401  CAREERS IN COMMUNICATION  1  PF  Offers insights into the many careers open to those with communication degrees and includes guest lectures from successful alumni. Provides strategies for career development. RESTRICTIONS: Open to junior and senior communication majors only.  

COMM 408  NEW MEDIA PROJECT DEVELOPMENT  3  
Application of communication research processes to designing new media (e.g., web sites, streaming video, electronic communication, interactive media) for a client. Involves conducting research for planning, developing strategies, designing prototypes, and making recommendations for implementation and evaluation. PREREQ: ART307 and CISC103 OR CISC181.  

COMM 409  PUBLIC RELATIONS CAMPAIGN PLANNING  3  
Comprehensive recap of the Integrated Marketing Communication function, with an emphasis on public relations research, objectives, strategies, integrated tactics, and campaign evaluation. Utilizes a small team “service learning” setup, wherein the teams adopt a client’s campaign and work closely with Board and staff members to produce and present a comprehensive public relations campaign plan. PREREQ: COMM309. RESTRICTIONS: Not open to COMI majors.  

COMM 413  PUBLIC RELATIONS MANAGEMENT  3  
Focuses on case studies and tactics that public relations practitioners need to know in corporate, non-profit, government, education, agency, entertainment, or media settings. Includes a strong emphasis on social media and e-portfolio development. PREREQ: COMM309. RESTRICTIONS: Not open to COMI majors.  

COMM 417  COMMUNICATION AND THE MANAGEMENT OF CONFLICT  3  
An overview of communication and the conflict process in face-to-face interaction. Emphasis on theories concerning the structure, analysis, and management of conflict situations.  

COMM 418  ADVANCED TOPICS IN MEDIA COMMUNICATION  3-9  
Current directions in mass communication theory and practice including new technologies, politics, broadcast programming and research, advertising and audiencer responses to media content. RESTRICTIONS: Not open to COMI majors. May be repeated three times for credit when topics vary.  

COMM 421  INTERCULTURAL COMMUNICATION  3  
Enhances students’ understanding of cultures, communication and intercultural communication processes. In addition, communicative strategies for improving intercultural communication is discussed. RESTRICTIONS: Some sections offered in Madrid, Spain and Costa Rica.  

COMM 423  COMMUNICATION, ADVERTISING, AND THE CONSUMER  3  
Introduction to the content of advertising, including portrayals of gender, race and sexuality. Investigate the relationship between advertising and the consumer, particularly what advertising cognitive effects can be and how they may result in behavioral effects. RESTRICTIONS: Not open to COMI majors.  

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. Method of how to conduct and assess research relating to mass media.  

COMM 425  ADVANCED TOPICS IN POLITICS AND BROADCAST JOURNALISM  3-9  
Topics vary and may include influence of crisis news on national and international politics, effectiveness of political documentaries and ethical and historical underpinnings of broadcast journalism. May be crosslisted with POSC425. RESTRICTIONS: Not open to COMI majors. May be repeated for nine credits when topics vary. When topic is News Documentary, COMM324 suggested prerequisite.  

COMM 427  BROADCAST NEWS  4  
Communication students learn the pressures and standards of broadcast news while writing and producing a scheduled studio TV program. Emphasis on writing news for broadcast, program story-selection issues, video selection, interviewing techniques, professionalism. Students produce a weekly news program in the lab. RESTRICTIONS: Not open to COMI majors.  

COMM 440  TOPICS IN INTERPERSONAL COMMUNICATION  3  
Topics vary and focus on significant areas of theory and research in interpersonal communication. Topics may include nonverbal communication, lifespan communication and communication in intimate relationships. May be crosslisted with WOMS440. RESTRICTIONS: May be repeated three times for credit when topics vary.  

COMM 442  TOPICS IN ORGANIZATIONAL COMMUNICATION  3-9  
Focuses on significant areas of theory and research in organizational communication. Topics may include gender, communication, or interpersonal relations in organizations, such as superior/subordinate relationships. May be crosslisted with PSYC443, WOMS442. RESTRICTIONS: May be repeated for up to nine credits when topics vary.  

COMM 443  COMMUNICATION AND EMOTION  3  
Introduces students to the role emotion plays in interpersonal communication and how communication influences our feelings. The course presents students with skill building exercises and writing assignments that are designed to put what they learn in the classroom into action in the real world. RESTRICTIONS: COMI majors only.
COMM 444 GLOBAL AGENDA 3 Seminar survey of current geopolitical problems facing the US government and global news media. Guest lecturers and practitioners in diplomacy and the international media explore the problems, US foreign policy and media influence upon both. Crosslisted with POSC444. RESTRICTIONS: May be repeated for credit when topics vary.

COMM 447 NATIONAL AGENDA 3 Seminar offered in conjunction with speaker series focused on current policy and political problems facing the United States. Guest lecturers, office holders and practitioners, and media and media practitioners explore the problems and their implications for the nation and for campaigns and decision making. Crosslisted with POSC447.

COMM 450 MEDIA EFFECTS 3 Examines history and nature of research on effects of mass media, particularly television, in such areas as attitude change, socialization, role modeling and sex and violence.

COMM 450I COMMUNICATION AND PERSUASION 3 An examination of how influence is created and resisted through communication in various settings, including personal relationships, public relations, advertising and political campaigns. Emphasis on contemporary theories of persuasion and attitude change, with applications to the various content areas studied.

COMM 453 HEALTH COMMUNICATION 3 This course examines theories and methods for studying relationships between media and health. Topics include media portrayals of health issues; public engagements with health information and technologies; and the role of media in health promotion.

COMM 454 CHILDREN AND THE MASS MEDIA 3 Mass media research and theory as they relate to children. Substantive areas include children's use and comprehension of media, content of children's television programming, television and the family, children and advertising and the media's contribution to social values and roles.

COMM 456 COMMUNICATION IN ORGANIZATIONS 3 Introduction to concepts and research related to communication processes in organizational settings. Both traditional and interpretive approaches are emphasized.

COMM 458 SCIENCE COMMUNICATION 3 This course examines how scientists communicate with journalists and citizens; how news and entertainment media present science and scientists; how messages about science shape public perceptions; and how citizens engage with scientific issues.

COMM 466 INDEPENDENT STUDY 1-3

COMM 468 UNDERGRADUATE RESEARCH IN COMMUNICATION 1-6 Undergraduate research in area of communication conducted on or off campus, out of class, and under supervision of faculty member. RESTRICTIONS: Open to junior and senior communication majors only. Requires permission of instructor.

COMM 476 SOCIAL MEDIA AND COMMUNICATION 3 Focus on how and why people use social media. Various social media platforms will be explored and their effect on communicative processes will be examined.

COMM 485 ANALYSIS OF FACE-TO-FACE COMMUNICATION 3 An examination of methods for analyzing face-to-face interaction, message construction, and message interpretation.

COMM 486 MULTIMEDIA LITERACY 3 Defines multimedia and discusses its impact on society. Surveys applications across the curriculum and reflects on the effects of multimedia on current teaching practice. Provides a multimedia toolbox and shows how to use it to create and publish multimedia applications on the Internet. Discusses multimedia frontiers, emerging technology and societal issues including human impact, regulation, copyright, fair use, equity, cost and universal access.

COMM 490 HONORS CAPSTONE 3 This course provides a capstone experience for Communication Honors majors. RESTRICTIONS: Restricted to Communication Honors majors.

COMM 601 EPISTEMOLOGY AND THEORY IN COMMUNICATION 3 General issues in the philosophy of knowledge and science critical for the understanding of theoretical conceptions and a comprehensive survey of theories in communication.

COMM 603 COMMUNICATION RESEARCH METHODS - PROCEDURES 3 Introduction to communication research methods including general research procedures, sampling, laboratory research and experimental design, survey research, field research, content analysis and longitudinal research. Includes an introduction to using the computer in research.

COMM 604 COMMUNICATION RESEARCH METHODS - ANALYSIS 3 Introduction to the tools and techniques of data analysis in communication research including descriptive statistics, hypothesis testing, inferential statistics, as well as advanced statistical procedures.

COMM 609 PUBLIC RELATIONS CAMPAIGN PLANNING 3 Comprehensive recap of the Integrated Marketing Communication function, with an emphasis on public relations research, objectives, strategies, integrated tactics, and campaign evaluation. Utilizes a small team "service learning" setup, wherein the teams adopt a community non-profit organization and work closely with Board and staff members to produce and present a comprehensive public relations campaign plan.

COMM 610 ORGANIZATIONAL COMMUNICATION THEORY 3 An examination of major theories of organizations including functionalist paradigm; interpretive paradigm; neoclassical paradigms (classical, social exchange systems theory and structural systems theory); and modern paradigms (technological systems theory, adaptive systems theory and integrative organizational theory).

COMM 611 COMMUNICATION AND THE MANAGEMENT OF CONFLICT 3 An overview of communication and the conflict process in face-to-face interaction. Emphasis on theories concerning the structure, analysis, and management of conflict situations.

COMM 612 COMMUNICATION RESEARCH METHODS 3 Course focuses on case studies and tactics that public relations practitioners need to know in corporate, non-profit, government, education, agency, entertainment, or media settings. Includes a strong emphasis on social media and e-portfolio development.

COMM 617 COMMUNICATION AND THE MANAGEMENT OF CONFLICT 3 An overview of communication and the conflict process in face-to-face interaction. Emphasis on theories concerning the structure, analysis, and management of conflict situations.

COMM 618 TOPICS IN MEDIA COMMUNICATION 3-9 Current directions in mass communication theory and research, cable television, radio and TV regulations, public policy.

COMM 621 INTERCULTURAL COMMUNICATION 3 Enhances students' understandings of cultures, communication and inter-cultural communication processes. In addition, communicative strategies for improving inter-cultural communication discussed.

COMM 623 COMMUNICATION, ADVERTISING AND THE CONSUMER 3 Introduction to the content of advertising, including portrayals of gender, race and sexuality. Investigates the relationship between advertising and the individual consumer, particularly what advertising's cognitive effects can be and how they may result in behavioral effects.

COMM 624 MEDIA MESSAGE ANALYSIS 3 Examination of methodology used to study media content and effects. Focus on past and ongoing research in broadcast, nonbroadcast and print media. The method of how to conduct and assess research relating to the mass media.

COMM 625 ADVANCED TOPICS IN POLITICAL AND BROADCAST JOURNALISM 3 Topics vary and focus on significant areas in politics and broadcast journalism. Topics may include crises news, political documentaries, broadcast presentations and credibility.

COMM 630 INTERPERSONAL COMMUNICATION THEORY 3 An examination of the theoretical orientations taken by scholars who study interpersonal relationships as well as a number of focused research areas. Of particular importance is the development of an understanding of the role of communication in creating and maintaining relationships.
COMM 640  TOPICS IN INTERPERSONAL COMMUNICATION  3-9
Significant research, theories and literature in communication, research design and theory building.
RESTRICTIONS: May be repeated three times for credit when topics vary. Open to graduate students only.

COMM 642  TOPICS IN ORGANIZATIONAL COMMUNICATION  3-9
Significant areas of theory and research in organizational communication. Topics may include gender, communication, or interpersonal relations in organizations, such as superior/subordinate relationships.
RESTRICTIONS: May be repeated for up to nine credits when topics vary. Open to graduate students only.

COMM 643  COMMUNICATION AND EMOTION  3
Introduces students to the role emotion plays in interpersonal communication and how communication influences our feelings. The course presents students with skill building exercises and writing assignments that are designed to put what they learn in the classroom into action in the real world.
RESTRICTIONS: Graduate students only.

COMM 652  COMMUNICATION AND PERSUASION  3
An examination of how influence is created and resisted through communication in various settings, including personal relationships, public relations, advertising and political campaigns. Emphasis on contemporary theories of persuasion and attitude change, with applications to the various content areas studied.
RESTRICTIONS: Open to graduate students only.

COMM 653  HEALTH COMMUNICATION  3
Examines theories and methods for studying relationships between media and health such as media portrayals of health issues; public engagements with health info and technologies; and the role of media in health promotion.
RESTRICTIONS: Graduate Students.

COMM 654  CHILDREN AND THE MASS MEDIA  3
Mass media research and theory as they relate to children. Substantive areas include children's use and comprehension of media, content of children's television programming, television and the family, children and advertising, and the media's contribution to social values and roles.
RESTRICTIONS: Open to graduate students only.

COMM 656  COMMUNICATION IN ORGANIZATIONS  3
An introduction to concepts and research related to communication processes in organizational settings. Both traditional and interpretive approaches are emphasized.
RESTRICTIONS: Open to graduate students only.

COMM 657  CHILDREN, TELEVISION AND EDUCATION  3
Issues relating to education, academic achievement, and the development of critical viewing skills in media and comprehension; content of children's television programming and advertising directed toward children; and the media's contribution to social values and roles; development of critical viewing skills curriculum.
May be crosslisted with EDUC657. RESTRICTIONS: Open to graduate students only.

COMM 658  SCIENCE COMMUNICATION  3
Examines how scientists communicate with journalists and citizens; how news and entertainment media present science and scientists; how messages about science shape public perceptions; and how citizens engage with scientific issues.
RESTRICTIONS: Graduate students.

COMM 664  INTERNSHIP  1-6
Provides the student with practical, on-the-job training in the field of his or her interest, i.e., interpersonal, mass media, public relations or organizational communication.
RESTRICTIONS: Open to graduate students only.

COMM 670  MEDIA THEORY  3
Examination of theories of mass communication focusing upon media, society and the individual; sociocultural influences; the social context of the broadcast media; theories relating to effects of media violence; personal influence; social learning theory; diffusion theory; and media effects.
RESTRICTIONS: Open to Communication graduate students only.

COMM 676  SOCIAL MEDIA AND COMMUNICATION  3
Focus on how and why people use social media. Various social media platforms will be explored and their effect on communicative processes will be examined.
RESTRICTIONS: Graduate students only.

COMM 685  ANALYSIS OF FACE-TO-FACE COMMUNICATION  3
An examination of methods for analyzing face-to-face interaction, message construction, and message interpretation.
RESTRICTIONS: Open to graduate students only.

COMM 686  MULTIMEDIA LITERACY  3
Defines multimedia and discusses the impact it is having on society. Surveys applications across the curriculum and reflects on the effects of multimedia on current teaching practice. Provides a multimedia toolbox and shows how to use it to create and publish multimedia applications on the Internet. Discusses multimedia frontiers, emerging technology, and societal issues including human impact, regulation, copyright, fair use, equity, cost and universal access.
Crosslisted with EDUC685.

COMM 868  RESEARCH  1-12

COMM 869  MASTER'S THESIS  1-6

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COMPUTER ENGINEERING

CPEG 202  INTRODUCTION TO DIGITAL SYSTEMS  3
Analysis and design of logic circuits. Topics include: Boolean algebra and its application to switching circuits, simplification of switching functions, design of logic circuits at gate level and with MSI and LSI components. Analysis and design of synchronous and asynchronous sequential state machines.

CPEG 222  MICROPROCESSOR SYSTEMS  4
Introduction to microprocessors as embedded devices. Emphasizes Input/Output techniques, interrupts, real-time operation, high-level code debugging and interfacing to various types of sensors and actuators. Projects that address various embedded applications are a major part of the course.
PREREQ: CPEG202 and CISC181.

CPEG 298  ECE DESIGN CHALLENGES  3
Course includes a series of learning modules including electrical safety, use of test equipment, and interfacing microprocessors to sensors. Students complete a design assignment.
Crosslisted with ELEG298. PREREQ: ELEG205, CPEG222.

CPEG 323  INTRODUCTION TO COMPUTER SYSTEMS ENGINEERING  3
Studies general purpose, special purpose and embedded computer architecture. Principles of digital system design introduced including an introduction to tools for automated design and use of programmable logic devices.
PREREQ: CPEG222.

CPEG 324  COMPUTER SYSTEMS DESIGN I  3
Principles of computer system design are studied emphasizing tradeoffs involving cost, performance, testability, reliability and manufacturability. Topics include timing analysis, component and subsystem interconnect, noise effects debugging techniques, boundary scan testing and printed circuit layout. Laboratory work involves design and implementation of a computer subsystem.
PREREQ: CPEG323

CPEG 398  ECE DESIGN & ENTREPRENEURSHIP  3
Students work in small teams on various design challenges. The teams explore entrepreneurship opportunities by forming fictitious companies and selling their ideas.
Crosslisted with ELEG398. PREREQ: ELEG298.

CPEG 419  COMPUTER NETWORKS I  3
Foundation principles, architectures and techniques employed in computer and communication networks. Focuses on mechanisms used in TCP/IP protocol suite. Topics include connection management, end-to-end reliable data transfer, sliding window protocols, quality of service, flow control, congestion control, routing, LANs, framing, error control, analog versus digital transmission, packet versus circuit switching, multiplexing.
Crosslisted with CISC450. PREREQ: CISC260 or CPEG222. RESTRICTIONS: Knowledge of probability and statistics recommended. Credit cannot be received for both CISC450 and any of the following courses: CISC250, CPEG419, CISC500, ELEG651.

CPEG 420  COMPUTER NETWORK DESIGN AND MANAGEMENT  3
Introduces data networks and telecommunications, with emphasis on practical design and engineering. Covers fundamental computer and voice networking, aided by case studies and hands-on laboratories. Explores standards, protocols, current tools and technologies. Examines issues such as security, convergence, wireless, IPv6 and network management.

CPEG 421  COMPILER DESIGN  3
Introduction to compiler design, syntax and semantics, code generation and optimization. Design of high performance computers together with high performance optimizing compilers as an integral unit. Software/hardware tradeoffs in pipelined computers, superscaler computers and computers embedded in other systems.
PREREQ: CPEG323 and CISC361.
CPEG 422 EMBEDDED SYSTEM DESIGN
Examine modern digital computer design methods using industry standard electronic CAD synthesis tools. Topics include hardware design using VHDL, logic synthesis tools, simulation methods for synthesis and efficient coding techniques for synthesis. Includes experimental laboratory work to design and evaluate FPGA-based digital computer hardware.
RESTRICTIONS: Students should have previous knowledge of VHDL programming language.

CPEG 423 PCB & FPGA HARDWARE PROTOTYPING
This course focuses on the design, fabrication, and construction of Printed Circuit Boards and on using FPGA design kits.
PREREQ: CISC220 CPEG222.

CPEG 455 HIGH-PERFORMANCE COMPUTING WITH COMMODITY HARDWARE
3
New-commodity computing devices, e.g., GPUs, bring the originally elite high performance computing into the reach of general public. Principles of program optimization, GPU and IBM Cell architecture, along with concepts and techniques for optimizing general purpose computing on the new hardware. Crosslisted with ELEG455.

CPEG 457 SEARCH AND DATA MINING
3
With the increasing amount of textual information, it is important to develop effective search engines, such as Google, to help users manage and exploit the information. Examine the underlying technologies of search engines and get hands-on project experience. Requires good programming skills. Crosslisted with CPEG457.

CPEG 460 INTRODUCTION TO VLSI SYSTEMS
4
Study of CMOS VLSI devices, circuits and systems implemented in VLSI. CAD tools for the design and simulation of VLSI. Topics include the performance and limitations of VLSI systems, low level circuit design and system design with an emphasis on digital systems. Major chip design project required.
RESTRICTIONS: Students should have previous knowledge of logic design and MOS transistor operation.

CPEG 465 INTRODUCTION TO CYBERSECURITY
3
This cybersecurity course is an introduction to computer and network security and covers the foundation security policies and methods to provide confidentiality, integrity, and availability, as well as cryptography, auditing, and user security. Topics are reinforced with hands-on exercises run in a virtual machine environment.
May be crosslisted with CISCS65, ELEG465, MISY465.

CPEG 470 WEB APPLICATIONS SECURITY
3
This seminar-style cybersecurity course covers one specific discipline of information security known as application security. This discipline (APPSEC) refers to the development of software that can continue to function correctly even under constant scrutiny and attack by determined adversaries.
RESTRICTIONS: Programming experience in a high level language (e.g., C, C++, java, python). Credit cannot be received for both CPEG470 and CPEG670.

CPEG 471 PEN TEST AND REVERSE ENGINEERING
3
This cybersecurity course introduces techniques used to (1) identify strengths and exploit weaknesses in networked systems or hosts, and (2) reverse engineer programs of unknown origin and identify their function so to classify them as malware and highlight the level of risk that they represent.
PREREQ: CPEG465/CPEG665 or MATH549 or equivalent. Programming experience in assembly language (CISC260, CPEG222, or equivalent). RESTRICTIONS: Credit cannot be received for both CPEG471 and CPEG671.

CPEG 472 APPLIED CRYPTOGRAPHY
3
This cybersecurity course explores modern Cryptography covering algorithms and cryptosystems, cryptanalysis, and best practices for application and implementation of crypto in software systems.
PREREQ: CPEG465/CPEG665 or MATH549 or equivalent. RESTRICTIONS: Programming experience in a high level language (e.g., C, C++, java, python). Credit cannot be received for both CPEG472 and CPEG672.

CPEG 473 CLOUD COMPUTING AND SECURITY
3
This cybersecurity course introduces the virtualization and cloud computing technologies used in most modern online services. The unique and conventional security issues related to protecting these types of systems are addressed and reinforced with hands-on exercises run in a virtual machine environment.
PREREQ: CPEG/ELEG/CISC/MISY 465/665 or CPEG/ELEG 494/694 or experience with virtualization and computer networking. RESTRICTIONS: Credit cannot be received for both CPEG473 and CPEG673.

CPEG 474 SCADA SYSTEMS AND SECURITY
3
This cybersecurity course introduces SCADA (Supervisory Control And Data Acquisition) industrial control systems widely used in manufacturing, infrastructure, utilities, and control of buildings, ships, etc. Topics of SCADA, use in critical infrastructure, use of communications, vulnerabilities, and best security practices and design will be addressed.
PREREQ: CPEG465/CPEG665 or CPEG494/CPEG694. RESTRICTIONS: Credit cannot be received for both CPEG474 and CPEG674. Course in computer networking recommended.

CPEG 475 EMBEDDED COMPUTER SYSTEMS
3
Explores the practice of embedding computers and software in most modern devices - appliances, games, phones, vehicles, etc. Covers engineering issues as well as understanding best cybersecurity practices so that the resulting device does not become a target of attack for its owner.
PREREQ: CPEG465/CPEG665 or CPEG494/CPEG694. RESTRICTIONS: Credit cannot be received for both CPEG475 and CPEG675.

CPEG 476 SECURE SOFTWARE DESIGN
3
This cybersecurity course introduce the theory and practices used to help make a computer program secure and provide the skills needed to implement programs that are free from vulnerabilities.
RESTRICTIONS: Programming experience in a high level language (e.g., C, C++, java, python). Credit cannot be received for both CPEG476 and CPEG676. Graduate or upper level software course (design, etc.) recommended.

CPEG 479 SYSTEM HARDENING AND PROTECTION
3
Practical treatment of the defensive techniques used to harden computer systems to make them less vulnerable to cyber-attacks. Defect management, configuration/hardening, account control, logs/auditing, and risk assessment are covered and reinforced with hands-on exercises run in a virtual machine environment.
May be crosslisted with ELEG494.

CPEG 495 DIGITAL FORENSICS
3
Introduction to digital forensics as used to analyze criminal evidence in computer systems and digital media. Forensic tools and techniques for storage and memory analysis of Windows/Linux, network traffic, documentation are covered and reinforced with hands-on exercises run in a virtual machine environment.
May be crosslisted with ELEG495.

CPEG 496 TOPICS IN CYBERSECURITY
3
Explore topics in cybersecurity to coincide with the interests of students and current faculty. Potential topics include: (1) applications, web or cloud security, (2) risk management and incident response, (3) malware and reverse engineering, or (4) wireless, smartphone, or SCADA security. May be crosslisted with ELEG496.

CPEG 497 ADVANCED CYBERSECURITY
3
This seminar course explores areas in advanced computer and network security not covered in introductory cybersecurity classes. Provides insight into realistic complex defensive and offensive cybersecurity topics such as DoS attacks, DNS security, Email spam, On-line Authentication, Phishing, Cloud Security, Malware, and Web security.
PREREQ: CPEG465/CPEG665. Familiarity with basic networking protocols and operating systems. RESTRICTIONS: Credit cannot be received for both CPEG497 and CPEG697.

CPEG 498 SENIOR DESIGN I
3
Students apply their accumulated classroom knowledge to an electrical and computer engineering design problem. Students work in small teams and must present their finished designs at the end of the term. Crosslisted with ELEG498.

CPEG 499 SENIOR DESIGN II
3
Students apply their accumulated classroom knowledge to an electrical and computer engineering design problem. Students work in small teams and must present their finished designs at the end of the term. Crosslisted with ELEG499.

CPEG 611 SOFTWARE PROCESS MANAGEMENT
3
Software management studies processes and concepts for planning and monitoring all software life-cycle phases. Topics include management models and structures, project planning including scheduling, effort estimation and risk management, project personnel and organization, project control (monitoring, measurement, correction and performance standards), software configuration management, and process description languages and tools.
Crosslisted with CISC611.
CPEG 612 SOFTWARE DESIGN 3
Key software design concepts are introduced. Topics include basic design concepts, principles of good design, design strategies, software architecture and styles of architectural design, and design and architectural notations and languages. Detailed design, including design patterns and component design are also covered. Implementation issues that affect the design, including design support tools and tools for analyzing designs are discussed. Crosslisted with CISCM12.

CPEG 613 SOFTWARE REQUIREMENTS ENGINEERING 3
Rigorous methods to elicit, analyze, and specify the requirements of a software system. The task ranges from identifying stakeholders and their goals producing a precise software specification document. Topics may include data flow diagrams, use cases, UML sequence and collaboration diagrams, finite state machines, requirements for real-time and concurrent systems, entity-relationship diagrams, and logic-based specifications, as well as the analysis of specifications for consistency and completeness. Crosslisted with CISCM13.

CPEG 614 FORMAL METHODS IN SOFTWARE ENGINEERING 3
Formal approaches to the specification, verification, and design of software systems. Topics include representing programs as transition systems; liveness and safety properties; state space reachability; explicit, symbolic and automata model checking; temporal logics; symbolic execution; automated theorem-proving; and relational calculus. Learn to use state-of-the-art tools based on these methods, such as the model checker Spin. Crosslisted with CISCM614. RESTRICTIONS: Credit cannot be received for both CISC614 and CISCM14.

CPEG 615 SOFTWARE TESTING AND MAINTENANCE 3
Study of software testing and maintenance methodologies for modern software. Topics include approaches to automatic test case generation, test oracles, test coverage analysis, regression testing, program understanding, and software maintenance tools. A primary focus will be automation in software testing and maintenance approaches. Crosslisted with CISCM15.

CPEG 621 COMPILER DESIGN 3
Introduction to compiler design, syntax and semantics, code generation and optimization. Design of high performance computers together with high performance optimizing compilers as an integral unit. Software/hardware tradeoffs in pipelined computers, super-scalar computers and computers embedded in other systems. PREREQ: CPEG323 and CISCM361 or equivalent.

CPEG 622 EMBEDDED SYSTEM DESIGN 3
Examines modern digital computer design methods using industry standard electronic CAD synthesis tools. Topics include hardware design using VHDL, logic synthesis tools, simulation methods for synthesis, and efficient coding techniques for synthesis. Includes experimental laboratory work to design and evaluate FPGA-based digital computer hardware. PREREQ: CPEG322 or equivalent. RESTRICTIONS: Students should have previous knowledge of VHDL programming language.

CPEG 623 PCB & FPGA HARDWARE PROTOTYPING 3
This course focuses on the design, fabrication, and construction of Printed Circuit Boards and on using FPGA design kits. PREREQ: CISCM220 CPEG222.

CPEG 651 COMPUTER NETWORKS II 3
Foundation principles, architectures, and techniques employed in computer and communication networks. Focuses on mechanisms used in TCP/IP protocol suite. Topics include connection management, end-to-end reliable data transfer, sliding window protocols, quality of service, flow control, congestion control, routing, LANs, framing, error control, analog versus digital transmission, packet versus circuit switching, multiplexing. Crosslisted with CISC650. PREREQ: An undergraduate level course in computer architecture and operating systems. RESTRICTIONS: Knowledge of probability and statistics recommended. Credit cannot be received for CISC650 and any of the following courses: CISCM250, CPEG419, CISCM450, ELEG6651.

CPEG 652 PRINCIPLES OF PARALLEL COMPUTER ARCHITECTURES 3
Provides an introduction to the principles of parallel computer architecture. Begins at a level that assumes experience in introductory undergraduate courses such as digital system design, computer architecture, and microprocessor based systems. Crosslisted with ELEG652.

CPEG 655 HIGH-PERFORMANCE COMPUTING WITH COMMODITY HARDWARE 3
New commodity computing devices, e.g., GPUs, bring the originally elite high performance computing into the reach of general public. Principles of program optimization, GPU and IBM Cell architecture, along with concepts and techniques for optimizing general purpose computing on the new hardware. Crosslisted with ELEG655.

CPEG 657 SEARCH AND DATA MINING 3
With the increasing amount of textual information, it is important to develop effective search engines, such as Google, to help users manage and exploit the information. Examine the underlying technologies of search engines and get hands-on project experience that requires good programming skills. May be crosslisted with ELEG657.

CPEG 660 INTRODUCTION TO VLSI SYSTEMS 4
Study of CMOS VLSI devices, circuits and systems implemented in VLSI. CAD tools for the design and simulation of VLSI. Topics include the performance and limitations of VLSI systems, low level circuit design and system design with an emphasis on digital systems. Major chip design project required. PREREQ: Students should have previous knowledge of logic design and MOS transistor operation.

CPEG 665 INTRODUCTION TO CYBERSECURITY 3
Introduction to computer and network security and covers the foundations of security policies and methods to provide confidentiality, integrity, and availability, as well as cryptography, auditing, and user security. Topics are reinforced with hands-on exercises run in a virtual machine environment. May be crosslisted with CISC665, ELEG665, MISY665.

CPEG 670 WEB APPLICATIONS SECURITY 3
This seminar-style cybersecurity course covers one specific discipline of information security known as application security. This discipline (APPSec) refers to the development of software and how to incorporate security in the design and implementation of modern web applications. RESTRICTIONS: Credit cannot be received for both CPEG470 and CPEG670.

CPEG 671 PEN TEST AND REVERSE ENGINEERING 3
This cybersecurity course introduces techniques used to (1) identify strengths and exploit weaknesses in networked systems or hosts, and (2) reverse engineer programs of unknown origin and identify their functionality to classify them as malware and highlight the level of risk that they represent. PREREQ: CPEG465/CPEG665 or CPEG494/CPEG694. Programming experience in assembly language (CISC650, CPEG222, or equivalent). RESTRICTIONS: Credit cannot be received for both CPEG671 and CPEG671.

CPEG 672 APPLIED CRYPTOGRAPHY 3
This cybersecurity course explores modern Cryptography covering algorithms and cryptosystems, cryptanalysis, and best practices for application and implementation of crypto in software systems. PREREQ: CPEG465/CPEG665 or MATH549 or equivalent. RESTRICTIONS: Programming experience in a high level language (e.g. C, C++, java, python). Credit cannot be received for both CPEG672 and CPEG672.

CPEG 673 CLOUD COMPUTING AND SECURITY 3
This cybersecurity course introduces the virtualization and cloud computing technologies used in modern online services. The unique and conventional security issues related to protecting these types of systems are addressed and reinforced with hands-on exercises run in a virtual machine environment. PREREQ: CPEG/TECH/CISC/CS/MISY 465/665 or CPEG/ELEG 494/694 or experience with virtualization and computer networking. RESTRICTIONS: Credit cannot be received for both CPEG673 and CPEG673.

CPEG 674 SCADA SYSTEMS AND SECURITY 3
This cybersecurity course introduces SCADA (Supervisory Control And Data Acquisition) industrial control systems widely used in manufacturing, infrastructure, utilities, and control of buildings, ships, etc. Types of SCADA, use in critical infrastructure, use of communications, vulnerabilities, and best security practices and design will be addressed. PREREQ: CPEG465/CPEG665 or CPEG494/CPEG694. RESTRICTIONS: Credit cannot be received for both CPEG674 and CPEG674. Course in computer networking recommended.

CPEG 675 EMBEDDED COMPUTER SYSTEMS 3
Explores the practice of embedding computers and software in most modern devices - appliances, games, phones, vehicles, etc. Covers engineering issues as well as understanding best cybersecurity practices so that the resulting device does not become a target of attack for its owner. PREREQ: CPEG465/CPEG665 or CPEG494/CPEG694. RESTRICTIONS: Credit cannot be received for both CPEG675 and CPEG675.

CPEG 676 SECURE SOFTWARE DESIGN 3
This cybersecurity course introduces the theory and practices used to help make a computer program secure and provide the skills needed to implement programs that are free from vulnerabilities. RESTRICTIONS: Programming experience in a high level language (e.g. C, C++, java, python). Credit cannot be received for both CPEG476 and CPEG676. Graduate or upper level software course (design, etc.) recommended.
CPEG 691  SOFTWARE ENGINEERING PRACTICUM  3
Technical practicum guided by the individual student's interests. The student will contribute a significant software engineering project either on campus or in association with an off-campus private business or government agency. Must be arranged with, and approved in advance by, a CIS or ECE faculty member. Crosslisted with CISC691.

CPEG 694  SYSTEM HARDENING AND PROTECTION  3
Practical treatment of the defensive techniques used to harden computer systems to make them less vulnerable to cyber-attacks. Defect management, configuration/hardening, account control, logs/auditing, and risk assessment are covered and reinforced with hands-on exercises run in a virtual machine environment. May be crosslisted with ELEG694.

CPEG 695  DIGITAL FORENSICS  3
Introduction to digital forensics as used to analyze criminal evidence in computer systems and digital media. Forensic tools and techniques for storage and memory analysis of windows/linux, network traffic, documentation are covered and reinforced with hands-on exercises run in a virtual machine environment. May be crosslisted with ELEG695.

CPEG 696  TOPICS IN CYBERSECURITY  3
Examine varied topics in cybersecurity to coincide with the interests of students and current faculty. Potential topics include: (1) applications, web or cloud security, (2) risk management and incident response, (3) malware and reverse engineering, or (4) wireless, smartphone, or SCADA security. May be crosslisted with ELEG696.

CPEG 697  ADVANCED CYBERSECURITY  3
This seminar course explores areas in advanced computer and network security not covered in introductory cybersecurity classes. Course provides insight into realistic complex defensive and offensive cybersecurity topics such as DoS attacks, DNS security, Email spam, On-line Authentication, Phishing, Cloud Security, Malware, and Web security. PREREQ: CPEG465/CPEG665. Familiarity with basic networking protocols and operating systems. RESTRICTIONS: Credit cannot be received for both CPEG497 and CPEG697.

CPEG 819  TOPICS IN NETWORKING I  3
Examines standard routing protocols for wired networks such as OSPF and BGP, protocols for wireless mesh and ad hoc networks. Includes theoretical analysis of protocols and examination of data collected from networks. Topics such as load balancing, multicasting, and cross-layer interactions are covered. Crosslisted with ELEG819. PREREQ: CPEG439, CISC450, CISC650, or ELEG61 or equivalent. RESTRICTIONS: May be repeated twice for credit.

CPEG 852  ADVANCED TOPICS IN COMPUTING SYSTEMS  3
Focus on the challenges and opportunities in parallel computing systems and on the design and implementation of future high-end computer systems from multiple peta-scale up to exa-scale computers. Challenges are centered on the definition and specification of parallel program execution models that are sound, scalable and programable for the intended applications. RESTRICTIONS: May be repeated twice for credit.

CPEG 853  COMPUTER SYSTEM RELIABILITY  3
Introduction to reliability challenges in computer systems, including permanent, transient, and intermittent faults. Various types of redundancy for fault tolerant computing will be studied. Hardware/software approaches for reliability enhancement in various computer systems will be examined, emphasizing tradeoffs involving performance, power, and reliability.

CPEG 869  MASTER'S THESIS  3
Independent and laboratory study conducted for the purpose of contributing new data and theory in some field of Cybersecurity in which information is lacking. Although supervised, the work will be independent in character to encourage the development of initiative.

CPEG 895  CYBER SECURITY LABORATORY  3
Laboratory work in Cyber Security. May be crosslisted with ELEG895.

CRJU 201  PROBLEMS OF LAW ENFORCEMENT  3
Introduction to a range of legal, political, philosophical and sociological problems in institutions vested with the responsibility to enforce laws and/or preserve order.

CRJU 202  PROBLEMS OF CRIMINAL JUDICIARY  3
Focuses on problems and issues found in the American criminal court system. Includes court organization, the courtroom work group (prosecutors, defense attorneys, and judges), pretrial and trial procedures, and basic criminal law.

CRJU 203  PROBLEMS OF CORRECTIONS  3
General overview of the American corrections system and a survey of the most pressing correctional problems of the twenty-first century. Philosophy of punishment extensively discussed. Major emphasis on the nature of the prison experience, alternatives to incarceration, judicial intervention in correctional affairs and the controversy over the efficacy of rehabilitation programs.

CRJU 301  INTRODUCTION TO LEGAL STUDIES  3
Introduces legal studies as a multidisciplinary field. Crosslisted with LEST301.

CRJU 302  SOCIAL DEVIANCE  3
Defining deviance, research on deviance and explaining deviance. Crosslisted with SOCI302.

CRJU 303  JUVENILE DELINQUENCY  3
Historical definition of delinquency, abuse and neglect, research in delinquency, causes and treatment of delinquents. Crosslisted with SOCI303. PREREQ: SOCI201 or SOCI209

CRJU 304  CRIMINOLOGY  3
The nature, kinds and causes of crime. Criminal liability, criminal careers and organized racketeering. Crosslisted with SOCI304. PREREQ: SOCI201 or SOCI209.

CRJU 311  CAPITAL PUNISHMENT AND THE LAW  3
Overview of the law of capital punishment. Emphasizes the U. S. Supreme Court's major death-penalty decisions and the effects of these decisions. PREREQ: CRJU110 or CRJU203

CRJU 312  HISTORY OF CRIME AND CRIMINAL JUSTICE  3
Examines changing perceptions of criminal and deviant behavior and development of laws, institutions, and social policies to counteract crime from seventeenth century to present. May be crosslisted with HIST312.

CRJU 320  INTRODUCTION TO CRIMINAL LAW  3
An analysis of the evolution of criminal law within the larger societal context, and an overview of the basic structure and administration of criminal law in the United States. PREREQ: CRJU110

CRJU 322  CROWDS, CULTS AND REVOLUTIONS  3
Analysis of forms of behavior in relatively unstructured situations such as crowds, panics, riots and demonstrations; and processes of interaction: susceptibility, contagion, polarization, communication. Crosslisted with SOCI322. PREREQ: SOCI201

CRJU 324  AMERICAN CONSTITUTIONAL HISTORY  3
A survey of constitutionalism in the U.S. from the American Revolution to the present, emphasizing these broad areas of constitutional change: the balance of power between the federal government and the states, the Supreme Court's exercise of judicial review, the growth of presidential power, and the scope of civil rights and civil liberties. May be crosslisted with HIST324.

CRJU 325  ISSUES IN EMERGENCY MANAGEMENT  3
Overview of the development of emergency management in the United States, including the formation of the profession, integration of formal and informal organizations, crisis response, and perceptions of crime and deviance during emergencies. Crosslisted with SOCI324.

CRJU 332  CRIMINAL VIOLENCE IN AMERICA  3
Investigates the patterns and causes of violence in America, including crimes such as homicide, rape, assault, and domestic abuse and collective violence such as terrorism. Examines social control of violence, including adjudication within the criminal justice system. Places trends of violence in cross-national perspective.
CRJU 335  CRIME AND JUSTICE IN FILM AND LITERATURE  3
Examines the issues and ideologies found in noteworthy American and international films and writings that emphasize themes of justice, punishment, and social control. Contrasts cinematic and literary depictions of these themes with empirical research on criminality, violence, victimization, and the practices of criminal justice institutions.

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. May be crosslisted with ENGL330, SOCI336.

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
Analysis of law as a social process in both historical and comparative perspective. Focuses on various theories of law and society and relevant empirical research. Crosslisted with SOCI345.

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

CRJU 351  COMPARATIVE CRIMINAL JUSTICE SYSTEMS  3
Study of different criminal justice systems across the world including discussions of their approaches to law, policing, courts, and corrections, common law, civil law, Islamic traditions as well as others.

CRJU 352  INTERNATIONAL CRIMINAL JUSTICE  3
Introduction to basic structures of international criminal justice systems including international and transnational crime, international courts, transnational policing, and international criminal law.

CRJU 355  INEQUALITY, CRIME AND JUSTICE  3
Introduction to challenges in addressing crime in multiracial, multiethnic, class-stratified society. This context serves as backdrop for inquiry into crime causation, operations of the criminal justice system, and experiences of relevant actors. May be crosslisted with BAMS355, SOCI356.

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 368  INDEPENDENT RESEARCH  1-6
Independent research under the supervision of a faculty member. Requirements include preparation of a research report consistent with the professional literature in the field. Student and faculty member will file a learning contract describing the research and a report with the department chair. RESTRICTIONS: Requires permission of instructor.

CRJU 369  ALCOHOL, DRUGS AND CRIME  3
Examines the relationship between alcohol, drugs and crime, including societal response to offenders who commit alcohol/drug related offenses and offenders who engage in crime over drug markets. May be crosslisted with SOCJ369. PREREQ: CRJU110 or SOCI201

CRJU 370  PRISON AND PRISON SUBCULTURES  3
Provides an intensive examination of the social organization of prisons. Mainly examines how the prisoner subculture shapes and is shaped by social institutions. Special emphasis on how gender and race contribute to differential patterns of adjustment to incarceration. May be crosslisted with SOCJ370, WOMS370.

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 401  SENIOR SEMINAR  3
Culminates the legal studies minor by requiring an independent research project resulting in a term paper. Seminar focuses on a specific substantive issue, provides guidance from professor and chance to share ideas and problems with fellow students. Crosslisted with LEST401.

CRJU 408  DOMESTIC VIOLENCE POLICY AND PREVENTION  3
Reflects the current state of policy and practice among policy makers and practitioners in the field of domestic violence including legal issues, policy development, primary prevention, and models of best practice. Addresses the role of federal and state law. May include economic justice, mental health and trauma, and alternative models. Crosslisted with WOMS408. PREREQ: Any 200-level Women's Studies course.

CRJU 409  DOMESTIC VIOLENCE SERVICES  3
Examines issues in providing services to families in which domestic violence is occurring. Multiple service systems are explored, with emphasis on service coordination, service gaps, and public policy. Crosslisted with HDFS409. RESTRICTIONS: Open to juniors and seniors only.

CRJU 417  SEX CRIMES AND PUNITIONS  3
Discuss controversial topics surrounding sex crimes and punishments to develop students' abilities to think critically about connections between three areas: how we as a society respond to crime through our criminal justice systems; what we believe about crime and punishment; and what empirical research tells us. May be crosslisted with SOCI417, WOMS417.

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 424  WOMEN IN LITERATURE AND SOCIETY  3
This INSIDE/OUT class focuses on deep reading of several form of literature. The class investigates the role of women in literature as authors, readers and central characters, and uses literature as a window into social views of gender. Assigned material explores the particular themes of voice, agency, cultural difference and social structure. May be crosslisted with SOCI424, WOMS424. RESTRICTIONS: Permission of instructor.

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 socio-legal issues. Topics typically include capital punishment, abortion, the right to privacy, search and seizure, the Miranda rule, and freedom of speech and press.

CRJU 428  CORPORATE CRIME  3
Nature and causes of the deviant behaviors and crimes of large organizations. How organizations act, are accused of deviance and defend themselves in cases such as price-fixing, sale of unsafe drugs and illegal spying. Crosslisted with SOCI428.

CRJU 432  HIV/AIDS AND CRIME IN SOUTH AFRICA  3
Examines two major social problems in South Africa: crime and HIV/AIDS. Explore the problems historically, as well as their current prevalence and implications for the country. Examines sociological theories to broaden our understanding of the social problems which are compared with the US. Crosslisted with SOCJ432.

CRJU 435  PUNISHING SPEECH  3
Examines the use of the criminal law and other regulatory sanctions to punish certain types of speech and the efforts of courts to determine which speech is deserving of constitutional protection and therefore beyond governmental control.

CRJU 437  SEMINAR ON CORRECTIONS  3
An in-depth examination of current research and practice on selected topics in corrections. Emphasis will vary by semester but may cover topics such as philosophies of punishment, mass incarceration, prisoner re-entry, alternatives to incarceration, and restorative justice.

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.
### COMMUNICATION SCIENCES AND DISORDERS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
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<tbody>
<tr>
<td>CSCD 610</td>
<td>FDN 610 CLINICAL PRACTICE I</td>
<td>2</td>
<td>Basic concepts of clinical practice, including models of diagnosis, fundamentals of clinical data collection and measurement, treatment planning, professional writing; principles and procedures underlying assessment, remediation and documentation activities. RESTRICTIONS: Open only to SLP majors.</td>
</tr>
<tr>
<td>CSCD 611</td>
<td>LANG DISORDERS IN CHILDREN (BIRTH TO 5)</td>
<td>3</td>
<td>Assessment and intervention strategies for children ages birth to 5 years with semantic, pragmatic, and morphosyntactic receptive and expressive problems deficits. Language differences and disorders in various populations are covered, as well as means of assessment and intervention. RESTRICTIONS: Open to SLP majors.</td>
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## CRUJ 452 DRUGS AND THE CRIMINAL JUSTICE SYSTEM 3
Covers both drug and criminal justice issues, focusing on the drugs-crime nexus and the criminal justice system response. Examines issues of race, gender, victimization, international policy, and new policy responses including drug treatment, harm reduction, and restorative justice. Class is held at a local correctional facility, and half the students are inmates. May be crosslisted with SOCI452. RESTRICTIONS: Permission of instructor.

## CRUJ 455 YOUTH STREET OUTREACH 4
Implements an outreach program to youth in a low income, urbanized community in Wilmington. Students trained and monitored as outreach workers by their professor and by community volunteers. Outreach workers trained to approach youth hanging out on the street, engage them (through conversation and recreational activities), identify their needs, and direct them to resources. Students keep journals to record their observations and feelings. The goal of the class is to increase social capital among youth by encouraging and facilitating youth participation in community educational, recreational, and social support services/activities. Crosslisted with SOCI455.

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

## CRUJ 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 major theoretical positions that have dominated criminal justice policy making during that period.

## CRUJ 466 INDEPENDENT STUDY 1-6

## CRUJ 475 SOCIAL SCIENCE AND THE LAW 3
Examines the relationship of social science to law and the legal process, how social science has contributed to our understanding of law, and how social science has been employed in litigation. May be crosslisted with LEST475.

## CRUJ 480 CIVIL LIABILITY IN CRIMINAL JUSTICE 3
Examines what remedies, other than criminal prosecution, are available to victims of violence, wrongdoing, or deprivation of rights by public officials such as police and correctional officers. The course will cover: what an injured party needs to do to bring a federal civil rights claim, what types of rights are protected, and what forms of relief a court can order. In addition, it will consider the numerous defenses that police officers can raise to avoid liability.

## CRUJ 489 CRIME VICTIMS AND VICTIMS' RIGHTS 3
Examines victim-offender relationships, interactions between victims and the criminal justice system, and the connections between victims and other social groups and institutions (such as the media, social movements, advocacy groups, legislatures and the state). Explores victims' rights and compensation, fear of crime, measurement of victimization and the impact of victimization on the individual.

## CRUJ 495 FIELD EXPERIENCE IN CRIMINAL JUSTICE 4 PF
Practicum involving actual field experience in a criminal justice agency; e.g., law enforcement, courts or correctional agencies. Emphasis on relating the field experience to academic work. May be crosslisted with SOCI495. RESTRICTIONS: Requires permission of instructor. Not for major credit.
CSCD 651  CLINICAL PRACTICUM  1-3 PF
Student clinicians provide intervention to communicatively impaired clients, under supervision of a certified speech language pathologist at the university speech-language-hearing clinic. Focus on planning, staffing, implementation, modification, and outcomes assessment of evaluation and intervention procedures with clients and their families.
COREQ: CSCD650. RESTRICTIONS: Open only to SLP majors. May be repeated up to nine credits.

CSCD 710  FOUNDATIONS OF CLINICAL PRACTICE III  3
A continuation of Foundations I and II and will expand students knowledge and understanding of research methods in communication sciences. Focus is on scientific principles, ethical use of human participants, animal subjects and responsible conduct of research principles, and evaluation of scientific evidence. Student will begin developing their evidence-brief.
PREREQ: CSCD610 and CSCD620.

CSCD 711  NEUROGENIC DISORDERS OF SPEECH  3
Review of neuroanatomy and neurophysiology of brain motor systems. Characteristics of the dysarthrias and apraxia in children and adults due to congenital or acquired etiologies, including degenerative diseases. Focus on diagnosis and prognosis, and development of treatment goals.

CSCD 712  MNGMT OF LINGUISTICALLY DIVERSE POP.  3
Intended for students who intend to practice as bilingual speech-language pathologists. Fluency in language other than English is required. Course will review linguistic and cultural variations in language acquisition and child socialization across cultural and linguistically diverse populations. Course focus is on assessment and treatment of communication disorders in individuals from culturally and linguistically diverse groups.

CSCD 713  SEMINAR: SPECIAL TOPICS  2
Lecture-discussion with or without laboratory component on current topics in normal aspects of communication or identification, treatment and research in speech-language pathology and audiology.
RESTRICTIONS: May be repeated for eight credits.

CSCD 717  DIRECTED RESEARCH  1-3
Supervised laboratory experience in conducting research in communication sciences and disorders.
RESTRICTIONS: May be repeated for three credits.

CSCD 715  PROSEMINAR  1 PF
Presentation of research ideas, results by faculty, students. Variable content.
Speakers from the SLP program, other areas of the university and the general professional community present issues of concern to speech-language pathologists. Objectives 1. Student will demonstrate knowledge of basic human communication and swallowing processes, including their biological, neurological, acoustic, psychological, developmental, and linguistic and cultural bases.
Student will demonstrate knowledge of the nature of speech, language, hearing, and communication disorders and differences and swallowing disorders, including some etiologies, characteristics, anatomical/physiological, acoustic, psychological, developmental, and linguistic and cultural correlates. 3. Student will demonstrate knowledge of the process used in research and the integration of research principles into evidence-based practice.
RESTRICTIONS: May be repeated for two credits.

CSCD 750  ADV CLINICAL PRACTICUM SEM  0 PF
Course is taken concurrently with CSCD751 and is intended to provide a forum for peer discussion of theoretical and clinical issues related to the management of patients seen in schools or health facilities. Emphasis on evidence-based practice, clinical writing, and ethical/professional issues.
COREQ: CSCD751. RESTRICTIONS: Open to graduate students in the MA program in SLP.

CSCD 751  ADVANCED CLINICAL PRACTICUM  4 PF
Supervised practicum in health care facility or school setting.
COREQ: CSCD750. RESTRICTIONS: Restricted to students in the MA in SLP. May be repeated for up to eight credits.

CSCD 780  COMP ACADEMIC-CLINICAL PROJECT  1 PF
Comprehensive evidence-based project.

CSCD 869  THESIS  1-3 PF
Thesis course.
RESTRICTIONS: SLP MAJOR.
DANC 304  INTERMEDIATE JAZZ DANCE 3
Designed for students with prior dance experience. A continuation of DANC 204 with added emphasis on increased technical accuracy, extension of range and control, and clarity of performance for more complex dance sequences.
PREREQ: DANC204, or permission of instructor.

DANC 305  HIP HOP 3
Studies the development, history, communication style, dance form, and processes of creation through the urban expressive cultural phenomenon of hip-hop dance.

DANC 306  MUSICAL THEATRE STYLES 3
Designed for students with prior dance experience. An experiential historical overview of musical theatre dance styles from 20th century America to the present. Explores the roots and reinventions of vernacular dance in America as it revealed itself on the musical theatre stage.
PREREQ: One course from the following: DANC202, DANC203, DANC204, DANC302, DANC303, DANC304, or permission of instructor.

DANC 307  ETHNIC DANCE STYLES 3
Variable topics course from a array of cultural dance forms. Topics include dance forms of Africa, India, Hawaii, Brazil, among others.

DANC 308  DANCE COMPOSITION II 3
Develop knowledge of the basic elements begun in Dance Composition I. Simple compositional forms for the solo performer are developed into small group composition. Develop knowledge of relationship of choreography and performance.
PREREQ: DANC208 or permission of instructor.

DANC 309  REPERTORY 3
Rehearsal and performance of repertoire from established choreographers. Development of dance performance skills through restaging, rehearsal, and informal and formal presentation of choreography.
PREREQ: One course from the following: DANC202, DANC203, DANC204, DANC302, DANC303, DANC304, or permission of instructor.

DANC 310  METHODS OF TEACHING DANCE 3
Introduction to teaching dance in educational setting with emphasis on designing and delivering developmentally appropriate units of instruction and pedagogical analysis of effective teaching behaviors. Includes classroom management, teaching strategies, and performance-based assessment of pupil achievement.
PREREQ: One course from the following: DANC202, DANC203, DANC204, DANC302, DANC303, DANC304, or permission of instructor.

DANC 311  DANCE, DRAMA, AND LEARNING 3
Creative dance and drama develop the creative, physical, mental, and artistic aspects of an individual in a non-performance setting. Designed to provide an overview of approaches for integrating creative movement, dance, and drama into the classroom. Minimum of 10 hours of service learning is required.

DANC 312  THE BODY AND MOTION IN DANCE 3
Study of the body and movement as relevant to dance. Emphasis on anatomical and kinesiological principles, alignment, somatics, prevention and care of injuries, motor learning, and motor development with applications relevant to performance, choreography, and pedagogy.
PREREQ: One course from the following: DANC202, DANC203, DANC204, DANC302, DANC303, DANC304, or permission of instructor.

DANC 366  INDIVIDUAL STUDY 1-6
PREREQ: DANC202 or permission of instructor.

DANC 400  DANCE IN SCHOOL AND COMMUNITY SETTINGS 1-3
Practical experience in an approved dance or dance-related setting. Each credit earned requires a minimum of 30 clock hours.
PREREQ: DANC310 and Junior or Senior standing, or permission of instructor.

DANC 401  DANCE CAPSTONE EXPERIENCE 1-3
Interdisciplinary project that combines interest of student’s major with the dance minor. Projects may include research, outreach, technology, or original choreographic works.
PREREQ: Junior or Senior standing, or permission of instructor.

DISA 651  INTERNATIONAL COMPARATIVE ANALYSIS OF DISASTERS 3
Overview of international disasters, including impacts on development and a comparative analysis of how disasters are dealt with in different countries.

DISA 666  SPECIAL PROBLEM 1-12

DISA 670  ISSUES IN DISASTER RESPONSE 3
Focus on problems that arise before, during, and after emergencies and disasters. These include warnings response and risk perception, emergency response organization, developing Emergency Operations Centers, assessing and providing behavioral health needs, managing volunteers and NGOs, and the particular challenges of facilities.

DISA 680  DISASTER SCIENCE AND MANAGEMENT SEMINAR 1
Structured forum for the discussion and analysis of issues and problems in research and professional practice. Students will present their work and learn about professional practice. Discussions enable the participants to learn from their own and each others’ experience, create a spirit of collegiality and community.

DISA 857  PRACTICUM 1-3
Internship in organization or agency responsible for emergency or environmental management. Assigned to an organization to become familiar with issues, policies and practices pertaining to disasters. Under direct supervision of agency personnel while in the placement position. In addition to internship, students will meet weekly with the area coordinator and other students to discuss issues and experiences.
PREREQ: DISA650

DISA 866  SPECIAL PROBLEM 1-12

DISA 868  RESEARCH 1-9

DISA 869  MASTER’S THESIS 1-6

DISA 964  PRE-CANDIDACY 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.

DISA 969  DOCTORAL DISSERTATION 1-12 PF

CENTER FOR DISABILITIES STUDIES

DIST 100  INTRODUCTORY SEMINAR 1
Designed for freshmen and transfer students in the CHEP College, and provides students an opportunity to gain a greater understanding of the University and the CHEP College. Students learn practical skills helpful in mastering the freshman year or first year for transfer students. Attention given to time management and study skills, academic resources, and out-of-classroom opportunities. Other helpful tips to ease the transition into college area also be covered. Fulfills the First Year Experience (FYE) requirement for freshmen students.

DIST 301  DISABILITY STUDIES: SPECIAL TOPICS 3
Varying special topics related to disability studies.

DIST 400  SERVICE LEARNING PRACTICUM 3-6
Structured experience in a public or private, business, educational or non-profit setting as part of the Human Services, Education and Public Policy major. Requires written documentation of the experience by the student through various means such as a paper, portfolio, report, journal, etc.

DIST 433  INTERNET LITERACY 3
Provides the conceptual background and the online skills needed to become Internet literate. Includes a hands-on tutorial on creating Web pages and using search engines to conduct research. Reflects on the impact of emerging technologies on the future of schooling and communications.
DIST 465 SENIOR SEMINAR IN DISABILITY STUDIES 3
Culminates the Disability Studies minor. Focuses on community access, independence, inclusion, and productivity of people with disabilities. Examines national disability policy frameworks and applications, person-centered perspectives on delivery of services and supports, and methods of facilitating change. Requires completion of an applied local advocacy project.
PREREQ: HDFS270 or EDUC230. RESTRICTIONS: Open to Dist Minors or by permission.

DIST 533 INTERNET LITERACY 3
Provides the conceptual background and the online skills needed to become Internet literate. Includes a hands-on tutorial on creating Web pages and using search engines to conduct research. Reflects on the impact of emerging technologies on the future of schooling and communications.

AMERICAN MATERIAL CULTURE

EAMC 601 INTRODUCTION TO DECORATIVE ARTS IN AMERICA TO 1860 3
Development of decorative arts, painting and architecture in America. Principles of connoisseurship and studies of American and imported objects of art. Collections of the Winterthur Museum.
RESTRICTIONS: Requires permission of instructor.

EAMC 602 MATERIAL LIFE IN AMERICA 3
American domestic environments and decorative arts within social and economic contexts of 17th and 18th centuries. Critically assesses how objects contribute to the study of everyday life in colonial America.
RESTRICTIONS: Requires permission of instructor.

EAMC 604 AMERICAN INTERIORS 1800–1900 3
Explore changes in interior decoration in American homes from Early Republic to turn of the century through site visits to historic houses, design books in the Winterthur Library, and readings in advice books of the period. Each student will develop a furnishing plan for a particular historic site.
RESTRICTIONS: Requires permission of instructor.

EAMC 605 HISTORIOGRAPHY OF 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, anthropological, historical archeology, cultural geography, sociology and history.
Croslisted with HIST605. RESTRICTIONS: Requires permission of instructor.

EAMC 606 ISSUES IN AMERICAN MATERIAL CULTURE 3
Studies major themes in American material culture of the 17th, 18th or 19th centuries. Topics vary.
May be croslisted with HIST606, MSST606. RESTRICTIONS: Requires permission of instructor.

EAMC 607 ENGLISH DESIGN HISTORY, 1530–1930 3
Examines influence of English Design History on global culture, beginning with destruction of the monasteries and continuing to the beginning of the Great Depression. During this era, England became a world power. It made lasting contributions to architecture, art, landscape design, decorative arts, industrialization, and world navigation that were disseminated through exports, emigrating craftsmen, and design books. Course begins at Winterthur Museum and includes two weeks of field-based learning in London, England.
RESTRICTIONS: Requires permission of instructor.

EAMC 608 DECORATIVE ARTS AND DESIGN, 1860-PRESENT 3
Examines decorative arts and design from 1860 to the present. Topics include Victorian Culture and Aesthetics, the Arts and Crafts Movement, the Colonial Revival, Art Nouveau and Art Deco, Industrial Design, Modernism and Mass Production, and Contemporary Craft.
RESTRICTIONS: Requires permission of instructor.

EAMC 609 PREINDUSTRIAL CRAFTSMANSHIP IN AMERICA 3
Examines the world of preindustrial artisans in Colonial British America and Early Republic. Topics include elements of art, business, labor, social and technological history, and material culture. Examines original artifacts in the collections of Winterthur Museum and includes a 3-day field trip to Colonial Williamsburg to work in and study historic trades. Field-based learning complements an intensive examination of rare books and period manuscripts.
RESTRICTIONS: Requires permission of instructor.

EAMC 671 CONNOISSEURSHIP OF THE DECORATIVE ARTS IN AMERICA 1-3
Furniture with one additional subject within the decorative arts to be presented by a specialist on the Winterthur Museum staff. Emphasis on close analytical examination of objects stressing identification and evaluation.
RESTRICTIONS: Requires permission of instructor.

EAMC 672 CONNOISSEURSHIP OF THE DECORATIVE ARTS IN AMERICA II 1-3
Three subject areas within the decorative arts, each presented by a specialist on the Winterthur Museum staff. Emphasis on close analytical examination of objects stressing identification and evaluation.
RESTRICTIONS: Requires permission of instructor.

EAMC 673 CONNOISSEURSHIP OF THE DECORATIVE ARTS IN AMERICA III 1-3
One or two subject areas within the decorative arts in which students work closely with a specialist on the Winterthur faculty. Emphasis on close analytical examination of objects stressing identification and evaluation.
RESTRICTIONS: Requires permission of instructor.

EAMC 869 MASTER'S THESIS 3-6

EAST ASIAN STUDIES

EAST 136 TOPICS IN EAST ASIA IN FILM 1-3
Explores East Asian cinema and society via readings, discussion and viewing of films by and/or about East Asians. Topics vary. May be croslisted with HIST136. RESTRICTIONS: May be repeated for credit when topics vary.

EAST 266 SPECIAL PROBLEM 1-6

EAST 386 ASIAN AMERICA: CULTURE AND HISTORY 3
Explores the literature, culture and history of Asian Americans and immigrants to the United States variously using fiction, drama, poetry, documentary, photography, narrative film, drama, court cases, primary and secondary historical materials. Patterns of Asian immigration, anti-Asian violence and internment, Asian American resistance in litigation, legislation, and cultural activities, from Gold Rush to globalization.
Croslisted with ENGL386.

ECONOMICS

ECON 100 ECONOMIC ISSUES AND POLICIES 3
Takes a nontechnical approach to basic economics. Applies economic concepts to contemporary issues, problems and policies. Covers both macro and micro topics.
RESTRICTIONS: May not be taken for credit after taking ECON151 or ECON152. No majors within accounting, business administration, economics, finance, HRIM or MIS may receive credit for this course.

ECON 101 INTRODUCTION TO MICROECONOMICS 3
Introduces supply and demand concepts with basic economic graphs. Examines models of perfect and imperfect competition and determinants of production price and quantity. Covers microeconomic issues such as the effect of government regulation and environmental problems.
COREQ: One of the following: MATH114, MATH115, MATH117, MATH221, MATH241, MATH242, or MATH243.

ECON 102 CIVICS AND ECONOMICS FOR TEACHERS 3
Provides teacher candidates with an understanding of the fundamental content and concepts embedded within the core social studies subjects of civics and economics as they relate to K-8 standards-based instruction. Focuses on developing an understanding of the content in the two subject areas and how that content might be taught effectively.
Croslisted with PSYC102. RESTRICTIONS: Elementary teacher education majors only. Cannot be taken for credit toward economics major or minor or political science major or minor.

ECON 103 INTRODUCTION TO MACROECONOMICS 3
Analyzes the determinants of unemployment, inflation, national income and policy issues relating to how the government alters unemployment and inflation through government spending, taxes and the money supply.
PREREQ: ECON101.

ECON 251 MANAGERIAL ECONOMICS 3
Applies economic theory to business and managerial decision making. Includes analysis of consumer demand, theory of production and supply and the effects of different market structures and pricing strategies.
PREREQ: ECON101. Must earn C- or better in ECON101 and one of the following: MATH114, MATH115, MATH117, MATH221, MATH222, MATH241,MATH242 or MATH243. RESTRICTIONS: Credit can be earned for only one among ECON251, ECON255, ECON300 or ECON301.

ECON 255 INTERMED. MICROECONOMICS PUBLIC POLICY 3
Microeconomic theory of consumers, producers, and markets with special application to public policy issues and analysis.
PREREQ: ECON101. Must earn C- or better in ECON101 and one of the following: MATH114, MATH115, MATH117, MATH221, MATH222, MATH241,MATH242 or MATH243. RESTRICTIONS: Credit can be earned for only one of ECON251, ECON255, ECON300, and ECON301.
ECON 300  INTERMEDIATE MICROECONOMIC THEORY  3
Price determination and income distribution in a market economy; the behavior of firms and industry under conditions of pure and imperfect competition.
PREREQ: ECON101. Must earn C- or better in ECON101 and one of the following: MATH114, MATH115, MATH117, MATH221, MATH222, MATH241, MATH242 or MATH243. RESTRICTIONS: Credit can be earned for only one among ECON251, ECON255, ECON300 and ECON301. BS majors must take ECON301. ECON300 cannot be used to satisfy Economics B5 major requirements.

ECON 301  QUANTITATIVE MICROECONOMIC THEORY  3
Uses calculus to study price determination and income distribution in a market economy; and the behavior of firms and industry under conditions of pure and imperfect competition.
PREREQ: Must earn C- or better in ECON101 and one of the following: MATH221, MATH222, MATH241, MATH242 or MATH243. RESTRICTIONS: Credit can be earned for only one among ECON251, ECON255, ECON300 or ECON301. BS majors must take ECON301.

ECON 302  INTERMEDIATE MACROECONOMIC THEORY  3
Determinants of national income and employment and inflation; theoretical problem of short-run fluctuations and secular growth; relative merits of monetary and fiscal policy.
PREREQ: ECON103 and one of ECON251, ECON255, ECON300 or ECON301; or permission of instructor. Must earn C- or better in ECON103 and one of the following: ECON251, ECON255, ECON300 or ECON301.

ECON 308  BANKING AND MONETARY POLICY  3
Nature and economic significance of money, credit and the banking system; the origin and management of the money supply; and effects of monetary changes on price levels, output and employment.
PREREQ: ECON103.

ECON 311  ECONOMICS OF DEVELOPING COUNTRIES  3
Surveys policy issues related to economic growth and development. Special emphasis on problems facing contemporary developing countries.
PREREQ: ECON101 and ECON103.

ECON 315  ECONOMIC HISTORY OF COLONIAL AMERICA  3
Simple economic models and quantitative evidence used to explain colonial American history. Includes migration, servant and slave markets, government financing and the creation of paper money, causes of the Revolution, colonial growth, foreign trade, education and witchcraft.
PREREQ: ECON101 and ECON103.

ECON 316  ECONOMIC HISTORY OF THE UNITED STATES  3
Examines the record of economic change in the United States from the colonial period to the present. Emphasis on using economic theory and measurement for interpreting the past.
PREREQ: ECON101 and ECON103.

ECON 317  LATIN AMERICAN ECONOMICS  3
Examination of the challenges facing the economies of Latin America, including financial crises, inflation, labor markets, social protection, and trade. The role of institutions and public policy in specific Latin American economies is studied.
PREREQ: ECON101 or ECON103.

ECON 320  ENERGY ECONOMICS  3
Uses economic theory to examine the operation and efficiency of energy markets. Topics include regulation, energy efficiency and emission control, and public policies affecting energy markets.
PREREQ: ECON101.

ECON 321  ECONOMICS FOR THE ELEMENTARY CLASSROOM  3
Seniors in the University's Milford Professional Development School are required to take this course as part of their internship experience. Provides future elementary teachers enough economics to feel comfortable teaching the required economic standards for grades K-4. Literature selections and lesson activities reinforce the economic concepts.
PREREQ: ECON101 or ECON103.

ECON 332  ECONOMICS OF GOVERNMENT SPENDING AND TAXATION  3
Microeconomic and macroeconomic analysis of public expenditure, borrowing and taxaton. Introduction to stabilization, efficiency and distributional features of public finance.
PREREQ: ECON101. RESTRICTIONS: ECON332 and ECON433 cannot both count for degree credit.

ECON 333  CURRENT READINGS IN ECONOMICS  3
Books on controversial economic topics such as the Asian financial crisis, income distribution in America, environmental regulation, economic aid to developing countries, healthcare reform, privatizing Social Security and education vouchers are studied. Student papers and discussion form the essence of class sessions.
PREREQ: ECON101.

ECON 340  INTERNATIONAL ECONOMICS  3
Theory, problems and policy in international trade and finance with emphasis on developments since World War II.
PREREQ: ECON101 and ECON103. RESTRICTIONS: ECON340 cannot be taken for credit after ECON441 and/or ECON443.

ECON 341  ENVIRONMENT OF MULTINATIONAL CORPORATIONS  3
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.
PREREQ: ECON103.

ECON 342  STUDIES IN INTL ECONOMICS  3
Analysis of selected topics in International Economic, including international trade, international finance and the analysis of non-U.S. economies.
PREREQ: ECON101 and ECON103. RESTRICTIONS: May be repeated once for credit.

ECON 343  ENVIRONMENTAL ECONOMICS  3
Analyzes benefits and costs of environmental policy; reviews valuation techniques; assesses efficiency of decentralized, regulatory, tax and marketable permit policies to protect the environment. Uses graphical (non-calculus) economic analysis.
Crosslisted with APEC343. PREREQ: ECON101 or APEC150. RESTRICTIONS: Credit cannot be received for both APEC343 and APEC444.

ECON 350  ECONOMICS OF ENTREPRENEURSHIP  3
Analyzes impact of economic environment on behavior and development of new businesses. Reviews economic forces that influence new and developing businesses, including role of public policy. Requires development of a business plan which carefully considers economic factors most relevant to proposed business.
PREREQ: ECON101.

ECON 360  GOVERNMENT REGULATION OF BUSINESS  3
Normative, economic and legal foundations of government intervention in business, particularly antitrust and regulation; and the process and the effects of government policies.
PREREQ: ECON101. RESTRICTIONS: ECON360 and ECON463 cannot both count for degree credit.

ECON 364  ECONOMICS IN PRACTICE  3
Requires completion of at least 120 hours of an economics-related internship with verification by the hiring company. Term paper relating the real-world duties and experiences of the internship to principles learned in standard economics courses also required.
PREREQ: ECON300 or ECON301 or ECON303. RESTRICTIONS: Requires permission of instructor.

ECON 366  INDEPENDENT STUDY  1-6

ECON 381  ECONOMICS OF HUMAN RESOURCES  3
Analysis of labor markets and of the family. Topics include labor supply and demand, human capital, labor market discrimination, the distribution of income and theories of fertility and family structure. Public policy applications stressed.
PREREQ: ECON101. RESTRICTIONS: ECON381 and ECON483 cannot both count for degree credit.

ECON 385  WOMEN AND THE ECONOMY  3
Examines a wide range of economic issues relating to women’s lives, with special emphasis on family, work and income. Public policy applications and international comparisons are stressed.
May be crosslisted with WOMS385. PREREQ: ECON101.

ECON 390  ECONOMICS OF HEALTHCARE  3
Introduction to the United States healthcare system. Analysis of existing policies and proposals. Examines the roles of markets and government. Topics include costs, quantity and quality of healthcare systems, managed care and alternative delivery systems.
PREREQ: ECON101. RESTRICTIONS: ECON390 and ECON490 cannot both count for degree credit.

ECON 393  URBAN ECONOMICS  3
Uses simple microeconomic analysis to explain why cities exist, where they develop, how they grow, and how different activities are arranged within cities. Explores the economics of urban problems and policies related to local governments, land rent and land use patterns, poverty, housing, transportation, education, and crime.
PREREQ: ECON101.
ECON 406 ECONOMICS OF INFORMATION AND UNCERTAINTY 3
Investigates impact of costly information on 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: One of ECON251, ECON255, ECON300 or ECON301; MATH221, MATH241, MATH242, or MATH243; and MATH202 or MATH450.

ECON 408 ECONOMICS OF LAW 3
Effect of legal rules on resource allocation both in and between the public and private sectors. Considers common law, regulation and constitutional rules. May be crosslisted with LEST408. PREREQ: One of ECON251, ECON255, or ECON300 or ECON301.

ECON 410 ECONOMICS OF FINANCIAL MARKETS 3
Utilizes microeconomic theory to analyze and evaluate the operation of financial markets. Topics include portfolio allocation under certainty and uncertainty, asymmetric information, market efficiency, risk allocation, and behavioral finance. PREREQ: One of ECON251, ECON255, or ECON300, or ECON301, and MATH202 and either MATH221, MATH241, MATH242, or MATH243.

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: ECON101, ECON103 and MATH202.

ECON 418 ECONOMIC HISTORY OF AMERICAN LABOR MARKETS 3
Economic models 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: One of ECON251, ECON255, ECON300 or ECON301.

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: ECON103; and MATH221 or MATH241; and MATH202, MATH205, MATH350 or MATH450. Must earn a C- or better in ECON103; and MATH221 or MATH241; and MATH202, MATH205, MATH350 or MATH450.

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
Introduction to the mathematical approach and methods used in advanced economic theory. PREREQ: One of ECON251, ECON255, ECON300 or ECON301; and either MATH222, MATH242, or MATH243.

ECON 430 TOPICS IN MACROECONOMIC THEORY 3
Continuation of intermediate macroeconomic theory, including recent developments in the macroeconomic theory. PREREQ: ECON303.

ECON 433 ECONOMICS OF THE PUBLIC SECTOR 3
Role of government in the economy. Effects of taxation, spending and borrowing on resource allocation and income distribution. Special emphasis on cost-benefit analysis and current issues such as energy, environmental problems, negative income tax, urban finances and the national debt. PREREQ: One of ECON251, ECON255, ECON300 or ECON301. RESTRICTIONS: ECON332 and ECON433 cannot both count for degree credit.

ECON 435 CONTEMPORARY MACROECONOMIC POLICY 3
Unfolding events in the economy and the actions of policymakers are studied. Special emphasis on current policy actions of the Federal Reserve. Macroeconomic models studied in earlier courses are used to analyze current events. PREREQ: ECON303

ECON 436 SEMINAR IN PUBLIC POLICY ECONOMICS 3
Investigates current topics in economics, such as healthcare reform, privatizing social security, international trade restrictions and energy policy. Recent books and journal articles serve as basis for investigating these topics. Student papers and class discussion form the essences of class sessions. PREREQ: One of ECON251, ECON255, ECON300 or ECON301; and ECON303.
ECON 503  ECONOMIC ANALYSIS FOR BUSINESS POLICY  3
Business-oriented overview of microeconomic and macroeconomic theory.
Approximately two-thirds of the course will focus on microeconomics and one-
third on macroeconomics.
RESTRICTIONS: Cannot be taken for credit toward undergraduate or graduate
economics degrees. Not open to ECON graduate students in the MA, MS, or PhD
program. Open to all MBA, Pathways and business graduate students who are not in
the Economics undergraduate or graduate

ECON 530  APPLICATION OF MATHEMATICS IN ECONOMICS  3
Provides students with experience in the application of mathematics in
economics. Applications may vary from semester to semester. Mathematical
topics may include applications of ordinary and partial differential equations,
game theory, linear programming, dynamic programming, stochastic
programming and calculus of variations.
Crosslisted with MATH330. PREREQ: MATH302, MATH 349, ECON301 and
ECON303.

ECON 540  INTERNATIONAL ECONOMICS FOR MANAGERS  3
Survey of international economic issues relevant to managers operating in a global
context. PREREQ: ECON503 or permission of instructor. RESTRICTIONS: Cannot be taken
for undergraduate or graduate economics credit.

ECON 601  MONEY TALKS INSTITUTE  3 PF
Presents present and curriculum materials appropriate for the K-
12 classroom. Requires implementation of lessons, completion of lesson studies,
and analysis of student assessments.
RESTRICTIONS: Restricted to K-12 teachers.

ECON 602  MINI-SOCIETY  1 PF
Presents the research base and the procedures for implementing and maintaining
an experienced-based learning system, the Mini-Society, to teach economics,
teacher entrepreneurship, and citizenship in grades 3-6.
RESTRICTIONS: Restricted to teachers of grades 3-6.

ECON 604  MAKING SENSE OF MONEY AND BANKING  2 PF
Presents an in-depth look at the money and banking system in the United States
and analyzes instructional materials appropriate for teaching the content to
students in grades 3-12.
RESTRICTIONS: Restricted to teachers of grades 3-12.

ECON 606  MICROECONOMICS FOR SECONDARY EDUCATORS  3
Covers the economics of how markets operate including basics of supply, demand,
market failure and the role of government in the economy. Includes methods,
strategies, and lessons for the delivery of this content to students in grades 7-12.
RESTRICTIONS: Restricted to teachers of grades 7-12.

ECON 607  MACROECONOMICS FOR SECONDARY EDUCATORS  3
Covers how an economy functions as a whole, the business cycle, inflation and
unemployment. Presents the tools of monetary and fiscal policy and their
implementation on an economy. Includes methods, strategies, and lessons for the
delivery of this content to students in grades 7-12.
RESTRICTIONS: Restricted to teachers of grades 7-12.

ECON 609  ECONOMICS AND CHILDREN’S LITERATURE  1 PF
Uses children’s literature to teach basic economic concepts appropriate for grades
K-3. Develops skills for identify economic concepts and creating appropriate
instructional materials to integrate economics into reading, language arts and
mathematics.
RESTRICTIONS: Restricted to teachers of grades K-3.

ECON 612  ECONOMICS FOR THE ELEMENTARY EDUCATOR  3
Covers basic economic content appropriate for the elementary classroom.
Provides instructional materials to integrate economics with reading, language arts, and mathematics.
RESTRICTIONS: Restricted to teachers of grades K-6.

ECON 614  ECONOMICS SYSTEMS/INTERNATIONAL TRADE  3
Covers how different nations organize their economic systems and how each
pursues economic goals for their society including issues surrounding international
trade and globalization. Includes methods, strategies, and lessons for the delivery
of this content to students in grades 7-12.
RESTRICTIONS: Restricted to teachers of grades 7-12.

ECON 654  APPLICATIONS IN ENVIRONMENTAL ECONOMICS  3
Nonmarket valuation and other empirical methods used in the application of the
theory of environmental economics to policy issues pertaining to water and air
quality, climate change, and other relative environmental resources.
Crosslisted with MAST654.

ECON 668  RESEARCH  1-3

ECON 670  BENEFIT-COST ANALYSIS  3
Empirical analysis of environmental and natural resource policy issues. Topics
include valuation of natural resources, decision making under uncertainty,
dynamic control and intertemporal issues in resource use and institutional aspects
of policy analysis. Crosslisted with MAST672. PREREQ: ECON300 or ECON301.

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
Study of the allocation of natural resources, especially marine and coastal zone
resources, in modern economics. Application of economic theory to the problems
of misallocations and the means of correction, under both free and planned
markets.
Crosslisted with MAST675.

ECON 676  ENVIRONMENTAL ECONOMICS  3
Study of the choice of policies to protect the environment, including land, air and
water resources. Theory of market failure and externalities, use of economic
incentives in policy design, valuation of environmental resources and examination
of inefficiencies in existing U.S. environmental policies.
Crosslisted with MAST676.

ECON 677  PRACTICUM IN ECONOMIC EDUCATION  1-6
Research and analysis of public policy issues. Projects must demonstrate
applicability to economic education.
RESTRICTIONS: Requires enrollment in Master of Arts in Economic Education.

ECON 678  MONETARY AND INTERNATIONAL TRADE THEORIES FOR
ECONOMIC EDUCATORS  3
Studies international trade, free trade vs. protectionism, cartels, balance of trade
and payments, role of the financial sector, and monetary policy.
RESTRICTIONS: Requires enrollment in Master of Arts in Economics for Educators.

ECON 679  CONTEMPORARY ISSUES FOR ECONOMIC EDUCATORS  3
Emphasizes contemporary economic issues, problems and controversies.
RESTRICTIONS: Requires enrollment in Master of Arts in Economics for Educators.

ECON 801  MICROECONOMICS  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.
RESTRICTIONS: Cannot be taken for MS or PhD credit.

ECON 802  MACROECONOMICS  3
Studies the determination of output, employment, and the price level within
classical, neoclassical, and contemporary frameworks; analyzes the effects of fiscal
and monetary policy within these alternative frameworks, and examines the
determinants of economic growth.

ECON 803  APPLIED ECONOMETRICS I  3
Applies and modifies statistical techniques to economic data; presents the
essentials of econometric theory.
PREREQ: MATH202 or STAT471 or equivalent. RESTRICTIONS: Cannot be taken
for credit for MS or PhD degree in Economics.

ECON 804  APPLIED ECONOMETRICS II  3
Econometric techniques and data management using SAS. Emphasizes
applications of econometric methods, rather than econometric theory.
PREREQ: ECON803 or ECON822.
ECON 805  GAME THEORY FOR ECONOMISTS  3  Study of the theory of games with complete and incomplete information in both static and dynamic contexts with applications to economic problems, primarily in the areas of labor economics, economics of information and uncertainty, international trade, and macroeconomics.
PREREQ: ECON801 or ECON811.

ECON 810  MATHEMATICS FOR ECONOMISTS  3  Introduces fundamental mathematical tools utilized in theoretical economic analysis. Topics include basic set theory and real analysis, optimization in both static and dynamic environments, linear algebra, difference and differential equations, and probability theory. The use of these tools in constructing and analyzing economic models is emphasized.

ECON 811  MICROECONOMIC THEORY I  3  Covers foundations of microeconomics with emphasis on consumer and producer theory and market equilibrium. Extends the analysis to incorporate uncertainty. Introduces non-cooperative games in static and dynamic settings with full information, as well as general equilibrium theory and welfare analysis.
COREQ: ECON810.

ECON 812  MACROECONOMIC THEORY I  3  Examines the role of dynamic general equilibrium models in macroeconomic theory. Topics include capital accumulation, overlapping generations, economic growth, business cycle, unemployment, inflation, macroeconomic impact of fiscal and monetary policies. Emphasis is placed on tools such as dynamic programming, difference equations, and Markov chains.
PREREQ: ECON810.

ECON 813  MICROECONOMIC THEORY II  3  Emphasizes models of strategic behavior, particularly in settings with imperfect information, such as adverse selection, screening and signaling, principal-agent models, mechanism design and auctions. Extends general equilibrium models to include uncertainty and introduces social choice theory. This course is intended for doctoral students.
PREREQ: ECON810 and ECON811.

ECON 814  MACROECONOMIC THEORY II  3  Topics include capital accumulation and economic growth, unemployment, inflation, financial markets, the open economy and international monetary economics, economic fluctuations, stabilization policy, fiscal policy, monetary and banking policy. This course is intended for doctoral students.
PREREQ: ECON810 and ECON812.

ECON 820  ECONOMICS OF EDUCATION POLICY  3  Survey of theory, policy and practice of the field of Economic Education, including human capital, educational financing, and production of education.
PREREQ: ECON801 or ECON811; ECON803 or ECON822.

ECON 822  ECONOMETRIC THEORY I  3  Statistical basis for econometric analysis, which includes general linear model, discrete and continuous distributions, methods of estimation, properties of estimators, nested and non-nested hypothesis testing, asymptotic theory. All topics will be illustrated using the General Linear Model.
PREREQ: MATH202 or STAT471 or equivalent.

ECON 823  ECONOMETRIC THEORY II  3  Extensions of the General linear model, including heteroskedasticity, autocorrelation, identification and estimation of simultaneous equations, and error in measurement.
PREREQ: ECON822.

ECON 824  ECONOMETRICS OF CROSS-SECTION AND PANEL DATA  3  Econometric techniques used in applied microeconomic analysis. Cross-section techniques, limited dependent variables, panel data analysis. Additional topics may also be covered.
PREREQ: ECON822 and ECON823.

ECON 825  TIME-SERIES ECONOMETRICS  3  Introduction to time-series methods, including modeling multivariate systems. Development of methods to test and insure goodness-of-fit of time-series models. Additional topics may also be covered. Intended for doctoral students.
PREREQ: ECON822 and ECON823.

ECON 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. Crosslisted with APEC827. PREREQ: ECON801 and an econometrics/statistics course RESTRICTIONS: Requires permission of instructor.

ECON 829  ECONOMIC EDUCATION CURRICULA  2  Survey of educational materials and methods in Economic Education and of related assessment studies, especially at the K-12 levels.
PREREQ: EDUC805 or EDUC806. RESTRICTIONS: Cannot be taken for credit by MA and PhD students in Economics.

ECON 832  PUBLIC FINANCE  3  Examines recent research and literature in public finance. Topics include public goods, public choice, externalities and environmental policy, expenditure programs for the poor, social insurance, social security, health insurance, unemployment insurance, cost-benefit analysis, tax incidence, optimal taxation.
COREQ: ECON801 or ECON811.

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: ECON801 or ECON811; ECON803 or ECON822.

ECON 842  INTERNATIONAL FINANCE AND DEVELOPMENT  3  Continues ECON841. Covers foreign exchange markets, balance of payments, exchange rate systems and international economic policy.
PREREQ: ECON802 or equivalent.

ECON 845  DEVELOPMENT ECONOMICS  3  Analyzes topics of current interest in developing countries, such as labor markets, population, human capital and the disconnection of education.
PREREQ: ECON801 or ECON811 and ECON803 or ECON822.

ECON 846  TOPICS IN DEVELOPMENT ECONOMICS  3  Covers advanced topics in development economics using advanced theoretical and empirical tools. Possible topics include anti-poverty programs in rich and poor countries, migration, child labor, human capital investment, credit and insurance markets, gender, and the design of labor contracts.
PREREQ: ECON811 and ECON823.

ECON 850  DISSERTATION WORKSHOP  1  Designed to help PhD students further develop the writing and research skills necessary to complete a successful dissertation. Goal of the class is a completed dissertation proposal. Students will normally register for this course during their third year in the PhD program after completion of all required theory and econometric classes.
PREREQ: Requires permission of instructor.

ECON 852  MONETARY ECONOMICS  3  Compares the role of money in various macroeconomic models: transactions demand for money, long term effects of inflation and government deficit finance decisions in intertemporal models, capital theory and the pricing of financial securities as well as theories of the term structure of interest rates.
PREREQ: ECON801 or ECON812.

ECON 853  TOPICS IN INTERNATIONAL MACROECONOMICS  3  Advanced topics in international macroeconomics, including arbitrage and pricing relationships in foreign exchange markets, exchange rate forecasting, capital and trade flows as long run determinants of exchange rates, debt sustainability, fixed versus flexible exchange rate regimes, and currency unions and currency crises.
PREREQ: ECON812 and ECON823.

ECON 861  INDUSTRIAL ORGANIZATION AND REGULATION  3  Uses microeconomic theory and game theory to analyze the strategic interaction among firms. Topics include vertical and horizontal integration, vertical restrictions, cartels and collusion, pricing practices, entry deterrence, diffusion of technology, product differentiation, and government regulation of industry.
PREREQ: ECON801 or ECON811 and ECON803 or ECON822. ECON805 highly recommended.

ECON 862  TOPICS IN INDUSTRIAL ORGANIZATION AND REGULATION  3  Advanced topics including a wide range of issues in Industrial Organization and Regulation, such as: the regulation of specific industries and industrial practices, property rights, contracts, congestion pricing, the relative efficiencies of alternative modes of transport, market failures, and intermediation versus direct financing.
PREREQ: ECON811 and ECON823.

ECON 868  RESEARCH  1-9

ECON 869  MASTER’S THESIS  1-6

ECON 875  ADVANCED FISHERY ECONOMICS  3  Theoretical and applied study of the optimal utilization and management of commercial and recreational fisheries with emphasis on equity issues and the difficulty of deriving regulations which are biologically effective and which provide incentives for economic efficiency at reasonable costs.
Crosslisted with MAST875. PREREQ: MAST675 or ECON675
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. PREREQ: ECON801 or ECON811 and ECON893 or ECON822.

ECON 890  COLLOQUIUM: ECONOMICS SEMINAR SERIES  0 PF
Regularly scheduled lectures by faculty and visiting researchers providing exposure to current research in economics.

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

ECON 969  DOCTORAL DISSERTATION  1-12 PF

EDUCATION LIBRARY MEDIA

EDLM 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.

EDLM 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; and Dewey Decimal Classification.

EDLM 625  SCHOOL LIBRARY MEDIA PROGRAM ADMINISTRATION  3
Explores and evaluates administration and management of school library media centers. Topics include: planning and evaluation; policy making; personnel; budget; facilities; standards; research trends in area.

EDLM 628  SCHOOL LIBRARY MEDIA PROGRAM CURRICULUM  3
Explores the role of the school library media program in meeting information literacy and other education standards. Topics include information literacy, state education standards, advocacy, instructional technology and collaboration.

EDUCATION

EDUC 100  INTRODUCTION TO ELEMENTARY AND MIDDLE SCHOOL EDUCATION  1 PF
First year seminar covers issues in K-8 learning and instruction. Topics include the discipline options within the ETE major and examination challenges of K-8 education practices.

EDUC 166  SPECIAL PROBLEM  1-3

EDUC 205  HUMAN DEVELOPMENT: GRADES K-8  3
Explores theories of child and early adolescent development pertaining to education. Topics include biological, cognitive, linguistic, and social-emotional development and are taught through problem-based learning, large- and small-group discussion, case studies and lecture. Requires a service learning field placement in after-school sites. RESTRICTIONS: Limited to ETE majors and the Disabilities Studies and Educational Studies minors.

EDUC 210  BEGINNING LITERACY INSTRUCTION  3
Introduces research-based perspectives on literacy acquisition during kindergarten and first-grade years and emphasizes the integration of basic literacy skills, reading, writing, oral language, and instruction during instruction. Takes a cognitive orientation and highlights the influence of vocabulary development, phonemic awareness, and establishment of the alphabetic principle on literacy learning. Includes field experience. RESTRICTIONS: Open to ETE and ECE majors.

EDUC 230  INTRODUCTION TO EXCEPTIONAL CHILDREN  3
Historical and philosophical basis for special education; physical and psychological characteristics of exceptional children; study and discussion of past and emerging educational practices for exceptional children with emphasis on pedagogical commonalities. Systematic observation of a cross section of special education classes required. Emphasis on the school-age child. RESTRICTIONS: Open only to students in the Early Childhood Education, Elementary Teacher Education, Health Behavior Science and Human Services majors. Open only to students in the Disabilities Studies and Educational Studies minors.

EDUC 240  LEGAL AND ETHICAL ISSUES IN AMERICAN EDUCATION  3
Explores ethical and legal controversies in school discipline, intellectual freedom, students’ rights, moral and citizenship education, and other professional concerns.

EDUC 247  THE HISTORY OF EDUCATION IN AMERICA  3
American elementary and secondary schools from the colonial era to the 1980s, with particular attention to issues of expansion, diversity, reform, and the law.

EDUC 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.

EDUC 259  CULTURAL DIVERSITY IN COMMUNITY CONTEXTS  3
Examines roles and responsibilities of the classroom teacher through critical examination of field placement experiences in diverse community contexts. Topics include race, ethnicity, gender, sexual orientation, social class, poverty and language. RESTRICTIONS: Open to students in the Elementary Teacher Education and Human Services majors. Open to students in the Educational Studies, Urban Education and Human Development and Family Studies minors.

EDUC 266  SPECIAL PROBLEM  1-6

EDUC 286  EDUCATIONAL TECHNOLOGY: PROFESSIONAL TOOLS  1
Topics include educational resources and communication on the internet, word processing, authoring for the web, electronic grade books, statistics, presentation technology and assessment tools.

EDUC 297  INTRODUCTION TO PSYCHOLOGY IN SCHOOLS  3
Examines the ways in which psychology is applied in educational settings, including the role of schools in mental health service delivery to youth, an overview of mental health challenges that manifest in schools, and effective interventions to address these challenges.

EDUC 310  READING AND WRITING IN ELEMENTARY SCHOOL  3
Focuses on literacy development of second through sixth grade children. Explores relevant research and developmentally appropriate practices. Includes a field experience in a second through sixth grade classroom. PREREQ: EDUC210.

EDUC 320  READING AND WRITING IN THE MIDDLE GRADES  3
Focuses on methods and materials for developing literacy from grades four through eight. Explores practices suited to adolescent development. Includes a practicum in a fourth through eighth grade classroom. PREREQ: EDUC310.

EDUC 335  ELEMENTARY CURRICULUM: MATHEMATICS  3
Selection and use of appropriate methods and curriculum for teaching arithmetic in grades K-6. Focuses on curriculum materials, teaching strategies, lesson planning and implementation and the appraisal of pupil achievement. Practicum included. PREREQ: MATH253.

EDUC 341  ELEMENTARY CURRICULUM: SCIENCE  3
Introduction to teaching science in the elementary school. Includes the study of current elementary school programs, instructional materials, teaching strategies, lesson planning and implementation and the appraisal of pupil achievement. Practicum included.

EDUC 345  MENTORING STUDENTS: INT & DEV DISAB  3
Through classroom and field experiences, students learn the role of a mentor for youth and adults who have intellectual and developmental disabilities and how to facilitate their academic, social and business relationships in higher education settings, the surrounding campus community, and at local work sites. May be crosslisted with HDFS345.
EDUC 346    ELEMENTARY CURRICULUM: SOCIAL STUDIES  3
Introduction to teaching social studies in the elementary school. Includes
the study of current elementary school programs, instructional materials, teaching
strategies, lesson planning and implementation and the appraisal of pupil
achievement. Practicum included.

EDUC 348    INVESTIGATING SOCIAL STUDIES IN MIDDLE SCHOOL
COMMUNITIES  3
Encourages and supports professional development as a social studies teacher.
Students investigate teaching, learning and assessing at the middle school level
and consider their roles as educators in diverse classrooms and communities. Field
experience is required.
PREREQ: EDUC346.

EDUC 360    LEARNING IN COMMUNITY CONTEXTS  3
Study of the educational process in institutions and organizations with a focus on
non-profit groups oriented toward community service. Emphasis upon the relation
of these groups' educational practices to their overall public service mission.
May be crosslisted with HDFS360.

EDUC 366    INDEPENDENT STUDY  1-6
EDUC 368    UNDERGRADUATE RESEARCH  0-6
Undergraduate research conducted on or off campus, out of class, and under the
supervision of a faculty member.
RESTRICTIONS: Requires permission of instructor and approval of the Coordinator of
Undergraduate Research. May not fulfill course requirements in a major
curriculum except by departmental permission.

EDUC 387    INTEGRATING TECHNOLOGY IN EDUCATION  2
Introduces prospective teachers to technology available for use in classroom
content areas. Enables students to evaluate technology use and identify
and create classroom lessons that demonstrate effective use of technology
integration. Concludes with development of a teaching project incorporating the
use of technology.
PREREQ: EDUC286. RESTRICTIONS: Open to ETE majors only.

EDUC 390    CLASSROOM MANAGEMENT FOR SOCIAL AND EMOTIONAL
LEARNING  3
Focuses on creation of positive classroom learning environments by fostering
children's social and emotional development, infusing behavior supports in
academic instruction, enhancing motivation for learning, and establishing well-
organized and respectful classrooms. Emphasis placed on learning core concepts
and practical research-based strategies. Field experience included.
RESTRICTIONS: Open to ETE majors only.

EDUC 391    HONORS COLLOQUIUM  1
First year interdisciplinary Honors seminar. May be team-taught, specific topics
vary.

EDUC 395    BUILDING COMMUNITIES OF LEARNERS IN URBAN CONTEXTS  3
Designing educational communal environments sensitive to diverse needs of
urban school children: academic, emotional, moral, and relational. Holistic
integration of instruction, classroom management, and students' whole person
growth guided by mutual respect, caring, self-reflection, problem-solving,
educational philosophies, and professional collaboration. Field experience
included.
RESTRICTIONS: Open only to students in the Early Childhood
Education,Elementary Teacher Education, and Human Services majors and the
Urban Education minor.

EDUC 400    STUDEENT TEACHING  3-12 PF
Full-time extended student teaching experience in pre-kindergarten through 12th
grade schools. Students are under the guidance and supervision of cooperating
teacher(s) in the classroom and a University of Delaware supervisor.
RESTRICTIONS: Students must show evidence of passing a basic competency test
and must show evidence of taking content knowledge test(s) in their area(s)
of certification as required by the University Council on Teacher Education. In
addition, students must submit a com

EDUC 401    LANGUAGE DEVELOPMENT IN THE CLASSROOM  3
Applies knowledge about language development in school-age children to the
development of language processes and the assessment of language performance
for first and second-language speakers of English. Explores language processes
that provide a foundation for reading, speaking and listening. This course is
delivered online.

EDUC 403    LITERATURE FOR ADOLESCENTS: MULTIMEDIA TEXTS  3
Explores classic and contemporary reading materials and non-print texts pervasive
in lives of adolescents. Addresses selection of texts for middle school classes as
well as techniques for developing and promoting critical reading and informed
interpretation of non-print texts. May be crosslisted with ENGL403.

EDUC 404    TEACHING SCIENCE IN THE MIDDLE SCHOOL  3
Introduction of curriculum and appropriate methods for teaching science concepts
to middle school students. Activities include review, development and evaluation
of curriculum materials, teaching strategies, research on student thinking and
assessment of student learning. Clinical experience required.
PREREQ: EDUC341. COREQ: SCEN650.

EDUC 406    TEACHING MATH IN THE MIDDLE SCHOOL  3
Introduction of curriculum and appropriate methods for teaching mathematical
concepts to middle school students. Activities include review, development and
evaluation of curriculum materials, teaching strategies, research on student
thinking and assessment of student learning. Clinical experience required.
PREREQ: EDUC335.

EDUC 410    ASSISTIVE TECHNOLOGY  1
Prepares special education teachers to identify, evaluate, and use assistive and
augmentative technologies to support the education of exceptional learners.
Focuses on promoting academic learning and accommodating academic, physical,
and sensory disabilities.
PREREQ: EDUC230.

EDUC 411    INTRODUCTION TO EDUCATIONAL TECHNOLOGY  3
Comprehensive overview of the field of educational technology. Aligns the
principles of how people learn with technological tools proven effective across the
disciplines. Identifies and compares national and international standards
frameworks and introduces the educational technology knowledge base of
researched best practices for improving results.

EDUC 413    ADOLESCENT DEVELOPMENT AND EDUCATIONAL PSYCHOLOGY  4
Examines socio-emotional and cognitive development of adolescent learners;
psychological processes underlying learning, motivation, and classroom behaviors;
and teacher-student and group processes. Addresses implications for creating
learning environments that encourage positive social interaction, active
engagement in learning, and self-motivation. Field experience in a high school
included.
RESTRICTIONS: Open only to sophomore, junior, and senior secondary education
majors.

EDUC 414    TEACHING EXCEPTIONAL ADOLESCENTS  3
Examines characteristics of exceptional adolescents and the historical, legal and
philosophical bases for special education. Focuses on teaching students with
special needs within general education settings using research-based instructional
strategies, classroom management, and related services.
RESTRICTIONS: Open only to students in secondary education majors, the Health
Behavior Science major, the Disabilities Studies minor, and the Educational Studies
minor.

EDUC 415    PRACTICUM IN SECONDARY SPECIAL EDUCATION  1-2
Practicum field experience in a Professional Development School that
incorporates observation of teachers' strategies to differentiate instruction and
opportunities to tutor a student with special needs.

EDUC 419    DIVERSITY IN SECONDARY EDUCATION  3
Examines aspects of diversity (e.g., gender, class, language) in secondary schools
and classrooms. Reviews the foundations of multicultural education and considers
implications for curriculum, instruction and classroom management. Field
experience included.
RESTRICTIONS: Open only to students in secondary education majors, the
Educational Studies minor, and the Urban Education minor.

EDUC 420    READING IN THE CONTENT AREAS  1-3
Overview of reading comprehension issues at middle and high school levels based
primarily upon task analyses of content-area materials (math, social studies and
science). Students apply current theories of reading comprehension to texts in
their areas of interest.

EDUC 421    INTERNET TECHNOLOGIES  3
Presents the Internet from a dynamic workplace perspective. Reflects on how
emerging technologies will empower society to do more with the Internet. Covers
core Internet technologies, Web page design and authoring, networking
fundamentals, and technology planning. Provides a rich array of labs and optional
assignments.
EDUC 422  TEACHING READING IN SECONDARY ENGLISH  3
Focuses on reading comprehension issues and differentiated reading instruction for secondary English teachers. Students learn to make the reading level of adolescents and the readability of texts, integrate contextualized vocabulary instruction and word study, develop adolescents’ orality, and use strategies that develop independent reading.
PREREQ: ENGL110. RESTRICTIONS: Enrollment limited to English Education students.

EDUC 429  METHODS OF TEACHING FOREIGN/SECOND LANGUAGES IN ELEMENTARY SCHOOLS  3
Familiarizes students with appropriate teaching methods and techniques for the elementary foreign language classroom. Includes demonstrations by experienced FLES teachers, peer-analysis of video-taped model lessons prepared by participants, and an introduction to testing, materials and course design.

EDUC 431  APPLIED BEHAVIOR ANALYSIS  3
Prepares special education teachers to understand and apply the principles of behavior analysis in classroom settings. Focuses on conducting functional behavior assessments and designing behavior support plans for exceptional learners. Field placement required.
PREREQ: EDUC230. RESTRICTIONS: Restricted to juniors and seniors in the Elementary Teacher Education major, students in the Health and Physical Education Major who are also in the Health, Physical Activity and Disability minor, or permission of instructor.

EDUC 432  CURRICULUM AND INSTRUCTION FOR EXCEPTIONAL LEARNERS  3
Prepares special education teachers to understand and analyze the instructional needs of exceptional learners. Focuses on designing and implementing evidence-based interventions to support students’ access to general education curriculum. Includes development of Individual Education Plans and collaboration with parents and professionals. Field placement required.
PREREQ: EDUC230, EDUC310. COREQ: EDUC400.

EDUC 433  STUDENT TEACHING SEMINAR: ELEMENTARY ED 1-2 PF
Provides student teachers with the knowledge and tools to support student learning. Addresses educational issues to prepare student teachers for future professional learning and self-development.
COREQ: EDUC400.

EDUC 435  EDUCATIONAL EVALUATION FOR EXCEPTIONAL LEARNERS  3
Prepares special education teachers to participate in the evaluation of students with disabilities. Examines legal, ethical, and professional requirements. Includes administration, scoring, and interpretation of informal and formal academic tests, including screening and progress monitoring tools. Field placement required.

EDUC 436  DIFFERENTIATED LITERACY INSTRUCTION  3
Prepares elementary teacher education majors to identify, administer and analyze informal assessments and to use data to develop and implement differentiated literacy instruction.
PREREQ: EDUC310.

EDUC 437  DIAGNOSIS AND INSTRUCTION FOR LITERACY PROBLEMS  3
Prepares special education teachers to meet the needs of students with significant problems in reading and writing. Emphasis is placed on assessment of literacy problems and selection and implementation of interventions in reading and writing. Field experience required.
PREREQ: EDUC310. COREQ: EDUC400.

EDUC 438  LEARNING TECHNOLOGIES ACROSS CURRICULA  3
Develops a deep understanding of technology integration across the various content areas. Defines the concept of technological pedagogical content knowledge (TPACK) and negotiates the relationships between technology, pedagogy, and content. Builds an understanding of how technology can support active and constructive learning.

EDUC 439  EDUCATIONAL TECHNOLOGY TOPICS  3
In-depth study of a major problem in educational technology. Problems to be studied will vary with each offering.

EDUC 440  LITERACY INSTRUCTION FOR ENGLISH LANGUAGE LEARNERS  3
Focuses on effective literacy instruction for English Language Learners in elementary and middle school levels in the following areas: language development, vocabulary instruction, decoding, reading fluency, comprehension strategy instruction, and motivation and engagement.

EDUC 447  ADVANCED METHODS IN TEACHING ESL  3
Examines the application of evidence-based methods for building the English listening, speaking, reading and writing skills of school-aged individuals whose first language is not English. Topics include assessment, instruction, grouping, and intervention.
PREREQ: EDUC472. COREQ: EDUC400. RESTRICTIONS: Open to students in the Elementary Teacher Education major.

EDUC 450  TECHNOLOGY AND COGNITION  3
Presents major theories of learning and instruction and discusses their relationship to the use of computers in education. Emphasizes learning sciences theories, such as cognitive and socio-cognitive theories, and considers their role in the design and use of educational technology in real world settings.

EDUC 451  EDUCATIONAL ASSESSMENT FOR CLASSROOM TEACHERS  3
Explores principles and methods for construction and evaluation of student learning assessments, including knowledge, understanding and skills. Presents methods to enhance teacher inquiry into student learning. Considers strengths and limitations of each method in regard to informing teachers’ judgments. Discusses implications of assessment policy.

EDUC 456  eLEARNING  3
Surveys the field of eLearning, identifies the leading learning management systems, and reviews the major trends and issues related to using eLearning to improve educational results. Reflects on the role of eLearning in the National Education Technology Plan.

EDUC 459  URBAN SCHOOLS IN URBAN LANDSCAPES  3
Examines historical, sociocultural, economic, and political perspectives on the urban education experience. Includes consideration of ability, language, race/ethnicity, immigration, and power dynamics. Explores creation of socially just educational environments that address issues of equity and draw upon the resources, opportunities, and challenges in urban contexts.

EDUC 462  LANGUAGE ACQUISITION  4
The factors which distinguish human language from animal communication, as well as the development of many facets of language (semantics, syntax and phonology). To supplement reading and discussion, students gain research experience by working approximately eight hours per week on the on-going language acquisition projects.
May be crosslisted withLING472. RESTRICTIONS: Open to students in the Cognitive Science major, Elementary Teacher Education major, Linguistics major, or by permission of instructor.

EDUC 466  INDEPENDENT STUDY  1-6
Research internship with faculty mentor.

EDUC 469  RESEARCH INTERNSHIP EXPERIENCE  1-3
Research internship with faculty mentor.

EDUC 470  TOPICS IN EDUCATION  3
Examines selected education controversies in their broader philosophical and/or historical contexts. Draws upon and connects ideas from other education courses.
RESTRICTIONS: Juniors and seniors only.

EDUC 472  TEACHING ENGLISH AS A SECOND LANGUAGE  3
Investigation of the literature containing the traditional and modern techniques of teaching the pronunciation, grammar and vocabulary of American English; and devising and presenting lesson plans.
May be crosslisted withLING472. RESTRICTIONS: Open to students in the Cognitive Science major, Elementary Teacher Education major, Linguistics major, or by permission of instructor.

EDUC 473  SCHOOL-TO-ADULT LIFE TRANSITIONS AND DISABILITY  3
Examines legislation, research and practices relating to school-to-adult life transition for children and youth with disabilities. Topics include post-school outcomes and transition service models related to further education, employment and independent living; self-determination; family and community agency collaboration; transition assessment and planning.
RESTRICTIONS: Requires permission of instructor.

EDUC 475  SENIOR THESIS  3
Substantial research paper directed by faculty mentor.

EDUC 476  SECOND LANGUAGE ACQUISITION AND BILINGUALISM  3
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.
Crosslisted withLING476. PREREQ: LING101.
EDUC 485  MULTIMEDIA LITERACY  3
Defines multimedia and discusses its impact on society. Surveys applications across the curriculum and reflects on the effects of multimedia on current teaching practice. Provides a multimedia toolbox and shows how to use it to create and publish multimedia applications on the Internet. Discusses multimedia frontiers, emerging technology and societal issues including human impact, regulation, copyright, fair use, equity, cost and universal access. May be crosslisted with COMM486.

EDUC 492  EDUCATIONAL TECHNOLOGY CAPSTONE  3
A service learning practicum in which participants form teams to design and develop an educational technology solution in an actual school or workplace. Models metacognitive assessment through a learning community where participants create a shared knowledge base of best practices and tools of Web design. PREREQ: Requires permission of instructor.

EDUC 566  SPECIAL PROBLEM  1-12

EDUC 588  GEOMETRY AND MEASUREMENT FOR MIDDLE SCHOOL TEACHERS  3
Properties of 2-D and 3-D figures; measurement of length, area and volume; spatial relationships; transformations; connections with coordinate geometry; fundamentals of deductive system; van Hiele model of development of geometric reasoning, and use of Geometer's Sketchpad software to enhance package to enhance both teaching and learning of geometry and measurement. Crosslisted with MATH588.

EDUC 600  TEACHER AS RESEARCHER  3
Helps develop strategies to be used by teachers and administrators to bridge the gap between theory and practice. Assists teachers and administrators in initiating research on classroom problems related to teacher and student behavior and assessment.

EDUC 601  LANGUAGE DEVELOPMENT IN THE CLASSROOM  3
Applies knowledge about language development in school-age children to the development of language processes and the assessment of language performance for first and second-language speakers of English. Explores language processes that provide a foundation for reading, speaking and listening. This course is delivered online.

EDUC 602  CHILDHOOD LITERATURE  3

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

EDUC 604  TEACHING WRITING IN THE ELEMENTARY AND MIDDLE SCHOOL  3
Focuses on the development of appropriate instructional programs for elementary and middle school children. Provides information on the writing process, exemplary programs, evaluation of children's writing and functions/forms of writing. This course is delivered online.

EDUC 605  MEASUREMENT APPLICATIONS IN EDUCATION  3
Focuses on educational measurement strategies and processes that teachers use to assess student learning. Emphasis is on assessment skills and knowledge that can enhance professional practice and promote student learning.

EDUC 606  METHODS OF TEACHING FOREIGN/SECOND LANGUAGES IN ELEMENTARY SCHOOLS  3
Appropriate teaching methods and techniques for the elementary foreign language classroom. Includes demonstrations by experienced FL/ES teachers, peer-analysis of video-taped model lessons prepared by participants, and an introduction to testing, materials and course design.

EDUC 607  EDUCATIONAL RESEARCH PROCEDURES  3
An introduction to quantitative methods and procedures in education through the study of the logic and procedures of educational and social research. Provides information about the various stages of the research process with attention on measurement, sampling, design, data analysis and application.

EDUC 608  LITERACY ASSESSMENT AND INSTRUCTION I  3
The course focuses on effective literacy assessment and instruction in phonemic awareness, phonics and fluency. This course is delivered online.

EDUC 609  LITERACY ASSESSMENT AND INSTRUCTION II  3
The course focuses on effective literacy assessment and instruction in comprehension, vocabulary, and writing. This course is delivered online.

EDUC 610  BLACK COMMUNITY STUDIES  3-6
Inversion and analysis of various topics and developments of interest and significance to the Black community. Crosslisted with BAM5650. RESTRICTIONS: May be repeated up to six credits when topics vary.

EDUC 611  INTRODUCTION TO EDUCATIONAL TECHNOLOGY  3
Comprehensive overview of the field of educational technology. Aligns the principles of how people learn with the focus on how technology can be effectively used in education. Reviews the evolution of technology and how it has affected classroom instruction, curriculum, and teaching pedagogy in the past and present. Examines research related to the use of technology in learning and teaching. Crosslists with EDU611S.

EDUC 612  ADOLESCENT DEVELOPMENT AND EDUCATIONAL PSYCHOLOGY  3
Examines socio-emotional and cognitive development of adolescent learners; psychological processes underlying learning, motivation, and classroom behaviors; and teacher-student and group processes. Addresses implications for creating learning environments that encourage positive social interaction, active engagement in learning, and self-motivation. Field experience in a high school included.

EDUC 613  TEACHING EXCEPTIONAL ADOLESCENTS  3
Examines characteristics of exceptional adolescents and the historical, legal and philosophical bases for special education. Focuses on teaching students with special needs within general education settings using research-based instructional strategies, classroom management, and related services.

EDUC 614  DELAWARE READING PROJECT SUMMER INSTITUTE  6
The Delaware Reading Project (DRP) focuses on research, theory, and practice in literacy instruction for grades K-12. DRP's central purpose is for students to become familiar with and evaluate best practices in literacy instruction in order to develop a workshop for other teachers. PREREQ: EDUC608, EDUC622 or equivalent. RESTRICTIONS: Requires permission of instructor.

EDUC 617  INTRODUCTION TO SCHOOL PSYCHOLOGY  3
Explores roles and functions of school psychologists and current issues pertaining to assessment, education, and prevention/intervention for children with disabilities. Professional standards in school psychology, the history of school psychology, special services in the schools, and legal and ethical issues pertaining to school psychology and special education also are examined.

EDUC 618  DIVERSITY IN SECONDARY EDUCATION  3
Examines aspects of diversity (e.g., ethnicity, gender, class, language) in secondary schools and classrooms. Reviews the foundations of multicultural education and considers implications for curriculum, instruction, and classroom management. Field experience included. RESTRICTIONS: Open to secondary education majors/certification candidates only.

EDUC 619  FOUNDATIONS OF READING INSTRUCTION  3
Psychology and pedagogy of reading instruction. Lectures and demonstrations covering the following areas: psychology of the reading process, recent trends in reading instruction, initial reading procedures, directing reading activities, developing word recognition competence, developing efficient comprehension and differentiating instruction.
EDUC 621  INTERNET TECHNOLOGIES  3
Presents the Internet from a dynamic workplace perspective. Reflects on how emerging technologies will empower society to do more with the Internet. Covers core Internet technologies, Web page design and authoring, networking fundamentals, and technology planning. Provides a rich array of labs and optional assignments.

EDUC 622  THE ROLE OF LITERACY IN CONTENT AREAS  3
Explores contributions of literacy research for content learning (e.g., math, science, social studies, language arts). Underscores benefits of linking reading, writing, listening, speaking and viewing for acquisition of content area knowledge. Provides instructional frameworks for supporting student learning from texts. This course is delivered online.

EDUC 623  APPLIED HUMAN DEVELOPMENT IN THE SCHOOLS  3
Research and theory in child adolescent development are studied with an emphasis on applications in the schools. Designed primarily for school psychologists, school counselors and other educators. Examines the social, moral, affective, cognitive and biological bases of behavior within the school setting.

EDUC 624  INTRODUCTION TO AUTISM AND SEVERE DISABILITIES  3
An introduction to issues related to the identification and assessment of students with autism or severe disabilities. Presents identification instruments, assessment systems and their relation to theoretical models about these disabilities. Reviews the relationship between assessment and educational planning.

EDUC 625  SPECIAL EDUCATION INSTRUCTION/CURRICULUM: AUTISM/SEVERE  3
Reviews behaviorally-based educational models for students with autism and other severe disabilities. Presents methods aimed at enhancing functional skill development in the major life domains, with emphasis on community-based training. Includes lesson planning, implementing and evaluating instruction, and monitoring progress on Individualized Education Programs.

EDUC 626  FUNCTIONAL COMMUNICATION FOR INDIVIDUALS WITH AUTISM AND SEVERE DISABILITIES  3
Reviews appropriate functionally relevant communication objectives for students with autism and severe disabilities. Highlights the impact of functional communication upon social skills and behavior management. Presents a variety of alternative communication methods and modalities.

EDUC 627  MODELS OF INSTRUCTION  3
Study of alternative models of instruction as applied to differing instructional objectives, content and settings.

EDUC 629  PSYCHOLOGY OF TEACHING  3
A study of the research on teacher characteristics, teaching style and method, and teaching.

EDUC 630  SUPERVISED READING CLINIC: ELEMENTARY  3
Supervised practice and lecture in assessing and instructing students who struggle with reading and writing. Participants will have opportunities to implement and discuss a wide range of instructional approaches, methods, and materials as they work closely with elementary students. This course is delivered online. PREREQ: EDUCG608 and EDUCG609 or permission of instructor.

EDUC 631  ORGANIZATION AND SUPERVISION OF LITERACY PROGRAMS  3
Contextualizes assessment and instruction for reading in the whole-school context. Designed to introduce the leadership roles currently held by Reading Specialists and Literacy Coaches and includes an extensive school-level case study. This course is delivered online.

EDUC 634  MATHEMATICS CURRICULUM AND INSTRUCTION  3
Intended for students enrolled in the Mathematics concentration of the MAT in Secondary Education, this course focuses on curriculum and learning theory relevant to classroom teachers of Mathematics. RESTRICTIONS: Open only to students in the Math Concentration of the MAT in Secondary Education Program.

EDUC 635  METHODS FOR TEACHING SECONDARY MATHEMATICS  3
Intended for students enrolled in the Mathematics concentration of the MAT in Secondary Education, this course focuses on the basic elements of lesson planning, classroom practices and evaluation in the students chosen field. The course includes a mandatory field placement in a secondary education classroom. RESTRICTIONS: Open only to students in the Mathematics Concentration of the MAT in Secondary Education Program.

EDUC 636  ADVANCED METHODS FOR TEACHING SECONDARY MATH  3
Intended for students enrolled in the Mathematics concentration of the MAT in Secondary Education. Focus on unit planning, lesson evaluation, long-term reflection, and professional practices to enable long-term growth as a teacher. PREREQ: EDUCG635. RESTRICTIONS: Open only to students in the Mathematics Concentration of the MAT in Secondary Education Program.

EDUC 638  LEARNING TECHNOLOGIES ACROSS CURRICULA  3
Develops a deep understanding of technology integration across the various content areas. Defines the concept of technological pedagogical content knowledge (TPACK) and negotiates the relationships between technology, pedagogy, and content. Builds an understanding of how technology can support active and constructive learning.

EDUC 639  EDUCATIONAL TECHNOLOGY TOPICS  3
In-depth study of a major problem in educational technology. Problems to be studied will vary with each offering. RESTRICTIONS: May be repeated for credit when topics vary.

EDUC 640  INTRODUCTION TO CURRICULUM  3
Focuses on the curriculum that actually makes a difference – the curriculum that finds its way into the classroom. The three main areas: a) major goals of education and their influence on curriculum policy and teacher planning; b) operational curriculum (what happens in the classroom); and c) strategies suitable for evaluating the operational curriculum.

EDUC 641  SCIENCE CURRICULUM AND INSTRUCTION  3
Examination of the goals of science education and their relation to science curricula. Examination of theories of learning and motivation as they relate to how individuals develop scientific concepts. Discussion and development of science instructional materials and strategies that are consistent with current learning theories.

EDUC 642  TOPICS IN SCIENCE EDUCATION  3
In-depth study of a major problem in science education. RESTRICTIONS: May be repeated for credit when topics vary.

EDUC 643  ENVIRONMENTAL EDUCATION  3
Survey of and practice with existing environmental education materials and programs; the development of lessons in environmental education; and practical experiences with curriculum development and teaching procedures.

EDUC 646  ASSISTIVE TECHNOLOGY FOR SECONDARY SCHOOLS AND WORK  3

EDUC 647  ADVANCED METHODS IN TEACHING ESL  3
Examines the application of evidence-based methods for building the English listening, speaking, reading and writing skills of school-aged individuals whose first language is not English. Topics include assessment, instruction, grouping, and intervention. PREREQ: EDUCG672.

EDUC 649  DELAWARE WRITING PROJECT SUMMER INSTITUTE  6
Provides teachers opportunities to read and write professionally and create workshops on the teaching of writing. Develops knowledge of best teaching of writing practices. PREREQ: At least three years in the classroom. Must be nominated and invited.

EDUC 650  TECHNOLOGY AND COGNITION  3
Presents major theories of learning and instruction and discusses their relationship to the use of computers in education. Emphasizes learning sciences theories, such as cognitive and socio-cognitive theories, and considers their role in the design and use of educational technology in real world settings.

EDUC 651  DIVERSITY AND FAMILY SCHOOL COLLABORATION  3
Provides an ecological view of children in families and the relationships between families and the school system. Topics include family as a system, diverse family shapes in contemporary society, special families in special circumstances and models of intervention. RESTRICTIONS: Requires permission of instructor.
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.

EDUC 653 ASSISTIVE TECHNOLOGY: HIGH INCIDENCE DISABILITIES 3
Focuses on assistive technology for students with high incidence disabilities, K-12. Includes design principles, practical applications, legal requirements, and ethical considerations. Considers user-centered frameworks for assessment, planning, delivery, and utilization of technologies.

EDUC 654 AUGMENTATIVE AND ALTERNATIVE COMMUNICATION 3
Focuses on augmentative and alternative communication systems for persons with disabilities, especially in the elementary, secondary and post-secondary school setting. Topics include assessment of functional communication needs, matching those needs to communication strategies and devices, and evaluation and generalization of communication skills.

EDUC 655 ASSISTIVE TECHNOLOGY: AUTISM/SEVERE DISABILITIES 3
Focuses on assistive technology for students with autism/severe disabilities, K-12. Includes design principles, practical applications, legal requirements, and ethical considerations. Considers user-centered frameworks for assessment, planning, delivery, and utilization of technologies.

EDUC 656 ELEARNING 3
Surveys the field of eLearning, identifies the leading learning management systems, and reviews the major trends and issues related to using eLearning to improve educational results. Reflects on the role of eLearning in the National Education Technology Plan.

EDUC 657 CHILDREN, TELEVISION AND EDUCATION 3
Issues relating to education, academic achievement, and the development of critical viewing skills; media and comprehension; content of children's television programming and advertising directed toward children; and the media's contribution to social values and roles; development of critical viewing skills curriculum. Crosslisted with COMM657. RESTRICTIONS: Open to graduate students only.

EDUC 658 DISCIPLINE AND CLASSROOM MANAGEMENT 3
A review of discipline procedures, sources of assistance, legal implications, parental roles, management techniques and strategies for developing school discipline policies.

EDUC 659 URBAN SCHOOLS IN URBAN LANDSCAPES 3
Examines historical, sociocultural, economic, and political perspectives on the urban education experience. Includes consideration of ability, language, race/ethnicity, immigration, and power dynamics. Explores creation of socially just educational environments that address issues of equity and draw upon the resources, opportunities, and challenges in urban contexts.

EDUC 661 SCHOOL SITE FINANCES AND RESOURCE MGT 3
Focuses on the management and allocation of financial resources in PK-12 schools and school districts. Students will learn about school funding, budget management, and the larger state/district finance framework. RESTRICTIONS: Restricted to students in the School Leadership M.Ed. program.

EDUC 663 COUNSELING SKILLS LAB FOR COUNSELORS AND PSYCHOLOGISTS3 Provides students the opportunity to develop skills necessary for facilitating counseling relationships. Students observe, participate in and critique a variety of role playing exercises and actual counseling sessions as a means of mastering particular skills.

EDUC 664 LAW AND ETHICS IN SCHOOL LEADERSHIP 3
Examines legal and ethical aspects of school leadership in PK-12 schools and school districts. Focuses on schoolings legal framework and moral perspectives informing ethically defensible decisions. RESTRICTIONS: Restricted to students in the M.Ed. School Leadership program.

EDUC 665 ELEMENTARY STATISTICS 3
Provides a conceptual understanding of some useful statistical techniques along with practical computer and statistical skills which will enable the student to answer realistic research questions. Topics include descriptive statistics, regression, exploratory data analysis and hypothesis testing.

EDUC 666 SPECIAL PROBLEM 1-12

EDUC 669 ENGAGEMENT IN THE GENERAL CURRICULUM FOR STUDENTS WITH SEVERE DISABILITIES 3
Engage in critical analysis, and problem solving exercises through which they will discover instructional strategies designed to engage students with severe disabilities in the general curriculum. Addresses curriculum development and adaptations aligned to the Common Core Curriculum Standards. Research-based instructional strategies and curriculum considerations for teaching students with severe disabilities are included. Participants will use a variety of tools, strategies, and approaches to meet the individual needs of students while engaging in the general curriculum.

EDUC 671 PRACTICUM IN SCHOOL PSYCHOLOGY 3-6
Closely supervised experiences in various school and clinical settings. Students have the opportunity to develop and practice skills that must be mastered prior to starting the internship in school psychology. RESTRICTIONS: Requires permission of instructor.

EDUC 672 TEACHING ENGLISH AS A SECOND LANGUAGE 3
Investigation of the literature containing the traditional and modern techniques of teaching the pronunciation, grammar and vocabulary of American English; and devising and presenting lesson plans. May be crosslisted with LING672.

EDUC 673 SCHOOL-TO-ADULT LIFE TRANSITIONS & DISABILITY 3
Examines legislation, research and practices relating to school-to-adult life transition for children and youth with disabilities. Topics include post-school outcomes and transition service models related to further education, employment and independent living; self-determination; family and community agency collaboration; transition assessment and planning.

EDUC 674 SPECIAL EDUCATION INSTRUCTION & CURRICULUM: SECONDARY 3
Special education instruction and curriculum focused at the 6-12 levels, including lesson and unit planning, implementing and evaluating instruction and monitoring progress on Individualized Education Programs. Mathematics and content area instruction (social studies, science) are included (6-12).

EDUC 675 LANGUAGE ACQUISITION 4
Examines the factors which distinguish human language from animal communication as well as the development of many facets of language (semantics, syntax and phonology). Main emphasis on how children in the first three years acquire language. May be crosslisted with LING675, PSYC675.

EDUC 676 SECOND LANGUAGE ACQUISITION AND BILINGUALISM 3

EDUC 677 THE STRUCTURE OF ENGLISH 3
Explores current generative linguistic theories and the analysis of English phonology/morphology and syntax in the light of these theories. Contrastive analysis of English and a second language (such as Spanish). Crosslisted with LING677.

EDUC 678 HUMAN RESOURCE MANAGEMENT 3
Considers the ways in which organizations accommodate and utilize their human resources. Focuses on personnel management functions such as selection, maintenance and development.

EDUC 679 SPECIAL EDUCATION INSTRUCTION & CURRICULUM: ADVANCED 3
Special education principles and practices associated with effective, evidence-based instruction, assessment, and educational programming for students with high incidence disabilities across K-12. Examines multi-tiered interventions, accommodations, modifications, and services that support access to general education curriculum and inclusive settings, including related IEP considerations.

EDUC 680 EDUCATIONAL EVALUATION: EXCEPTIONAL CHILDREN & YOUTH 3
Procedures and practices for the assessment and identification of students with disabilities. Examines legal, ethical, and professional requirements related to assessment and IEPs. Administration, scoring, and interpretation of informal and formal tests used to determine learner's academic performance, including screening and progress monitoring.
EDUC 681  **TECHNIQUES FOR BEHAVIOR CHANGE AND POSITIVE BEHAVIOR SUPPORT**  
Focuses on behavioral principles and procedures for creating positive learning environments. Participants will conduct functional behavioral assessments of problem behaviors, implement behavior support plans to strengthen appropriate behaviors, and analyze their effectiveness in educational settings. Participants also will evaluate the ethics of behavioral interventions.  
3

EDUC 682  **SPECIAL ISSUES IN SPECIAL EDUCATION**  
Examines the current context for research, policy, and practice in special education, and reviews methods for analyzing and interpreting empirical research studies. Through a combination of collaborative inquiry and debate, literature reviews, and discussions, become knowledgeable about public controversies affecting the education of students with disabilities.  
RESTRICTIONS: Restricted to students in M.Ed. in Exceptional Children, or permission of instructor.  
3

EDUC 684  **VOCATIONAL TRAINING AND ASSESSMENT: SEVERE DISABILITIES**  
Focuses on designing and implementing vocational assessments and task modifications for students with multiple and severe disabilities. Participants learn hands-on training techniques.  
3

EDUC 685  **MULTIMEDIA LITERACY**  
Defines multimedia and discusses the impact it is having on society. Surveys applications across the curriculum and reflects on the effects of multimedia on current teaching practice. Provides a multimedia toolbox and shows how to use it to create and publish multimedia applications on the Internet. Discusses multimedia frontiers, emerging technology, and societal issues including human impact, copyright, fair use, equity, and universal access. May be crosslisted with COMM686.  
3

EDUC 688  **INTERNSHIP IN SCHOOL PSYCHOLOGY**  
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.  
3-6

EDUC 689  **ADMINISTRATION OF ELEMENTARY AND MIDDLE SCHOOLS**  
Study of administrative practices and procedures in the elementary schools with emphasis on the role of the elementary school principal.  
3

EDUC 690  **ADMINISTRATION OF SECONDARY SCHOOLS**  
A study of administrative practices and procedures in secondary school with emphasis on the senior high school administrator.  
3

EDUC 691  **APPLIED STATISTICS AND RESEARCH DESIGN**  
Designed to develop students’ skills in statistics and research for use in educational practice. Emphasizes planning and implementing program evaluation projects in educational settings.  
3

EDUC 692  **EDUCATIONAL TECHNOLOGY CAPSTONE**  
A service learning practicum in which participants form teams to design and develop an educational technology solution in an actual school or workplace. Models metacognitive assessment through a learning community where participants create a shared knowledge base of best practices and tools of Web design.  
RESTRICTIONS: Requires permission of instructor.  
3

EDUC 693  **SUPERVISION AND PROFESSIONAL DEVELOPMENT OF EDUCATORS**  
Examines the intellectual, moral, and practical dimensions of supervisory leadership in PK-12 school settings; connects theory and practice related to performance appraisal; and promotes the professional learning of educators.  
RESTRICTIONS: Restricted to students in the M.Ed. in School Leadership program.  
3

EDUC 694  **ORGANIZATIONAL MANAGEMENT**  
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.  
3

EDUC 695  **INTRODUCTION TO LEADERSHIP THEORY**  
Studies current applications of leadership research to educational administration. Includes some history of leadership studies. Focuses on instructional leadership, leadership style and the development of leadership skills.  
3

EDUC 696  **METHODS OF TEACHING SECONDARY SCIENCE**  
Teaching science, science standards, design of curriculum, instructional strategies and assessment of student learning. Includes classroom-based practicum in middle or high school.  
3-4

EDUC 697  **EDUCATION OF EXCEPTIONAL CHILDREN**  
Historical and philosophical basis for special education; legislative mandates and litigation that established the right to a free, appropriate, public education; physical, psychological and educational characteristics of exceptional children; study of past and emerging education practices for exceptional children with emphasis on pedagogical commonalities.  
3

EDUC 704  **TEACHING SCIENCE IN MIDDLE SCHOOL**  
Introduction of curriculum and appropriate methods for teaching science concepts to middle school students. Activities include review, development and evaluation of curriculum materials, teaching strategies, research on student thinking and assessment of student learning. Clinical experience required.  
RESTRICTIONS: Restricted to students in the Master’s of Arts in Teaching (MAT) program who are pursuing secondary science education teacher certification.  
3

EDUC 706  **TEACHING MATH IN MIDDLE SCHOOL**  
Introduction of curriculum and appropriate methods for teaching mathematical concepts to middle school students. Activities include review, development and evaluation of curriculum materials, teaching strategies, research on student thinking and assessment of student learning. Clinical experience required.  
RESTRICTIONS: Restricted to students in the Master’s of Arts in Teaching (MAT) program who are pursuing secondary mathematics education teacher certification.  
3

EDUC 720  **TEACHER LEADERSHIP IN EDUCATION POLICY**  
Supports the development of teacher leaders to understand, influence, and implement educational policy in their schools.  
3

EDUC 722  **TEACHING READING IN SECONDARY ENGLISH**  
Focuses on reading comprehension issues and differentiated reading instruction for secondary English teachers. Students learn how to determine the reading level of adolescents and the readability of texts, integrate contextualized vocabulary instruction and word study, develop adolescents’ orality, and use strategies that develop independent reading.  
RESTRICTIONS: Restricted to students in the Master’s of Arts in Teaching (MAT) program who are pursuing secondary English education teacher certification.  
3

EDUC 729  **BEHAVIORALLY BASED TEACHING PRACTICUM**  
Supervised practicum involves instructional activities in a classroom serving students with autism and other severe disabilities and serves as the capstone course of the autism certification.  
PREREQ: EDUC624, EDUC625, EDUC626 and EDUC681.  
RESTRICTIONS: Only available to those students in the Autism/Severe Disabilities concentration within the M.Ed. in Exceptional Children and Youth program or students pursuing Autism certification through Professional and Continuing Studies.  
3

EDUC 731  **TEACHING MATHEMATICS TO SPECIAL NEEDS STUDENTS: K-12**  
Explores current learning theories in mathematics education and pedagogy for special needs students based on these theories. Topics include number and operations, algebra, geometry, measurement, and data analysis. Examines how school mathematics curricula develop these topics and differentiation in math classroom.  
RESTRICTIONS: Open to students in the certification track of the MEd in Exceptional Children and Youth program or with permission of instructor.  
3

EDUC 732  **COMMUNITY BASED PRACTICUM**  
Provides graduate students with a community based field experience working with children and adolescents in a variety of non-school settings such as after-school programs, community centers, and residential facilities. Sociocultural approaches to conducting research in these settings is examined.  
RESTRICTIONS: Requires permission of department.  
1-3

EDUC 733  **LEADING THE INSTRUCTIONAL PROGRAM I**  
Understanding the characteristics of effective instruction and classroom management across the content areas at the classroom level in PK-12 schools. First of a two-course sequence.  
RESTRICTIONS: Restricted to students in the M.Ed. in School Leadership Program.  
3

EDUC 735  **DATA BASED DECISION MAKING AND ASSESSMENT**  
Prepares aspiring PK-12 leaders to understand, manage, and use data for student assessment, instructional planning, and school improvement. Online course.  
3

EDUC 737  **ORGANIZATIONAL CULTURE AND COMMUNITY RELATIONS**  
Focuses on building a cohesive, improvement-oriented organizational culture in PK-12 schools, on developing a shared program vision among school and community stakeholders, and on maintaining positive school-community relations.  
RESTRICTIONS: Restricted to students in the M.Ed. in School Leadership Program.  
3
EDUC 738  SCHOOL MANAGEMENT AND IMPROVEMENT PLANNING  3
Organizational management and effective planning and decision-making for PK-12 school improvement. Tasks and responsibilities of school management, challenges of implementing change, and best practice models of program design and school improvement will be covered.
RESTRICTIONS: Restricted to students in the M.Ed. in School Leadership Program.

EDUC 739  INTERNSHIP IN SCHOOL LEADERSHIP  2-4 PF
Engage in leadership-related field experiences in approved school settings. 2 credits of internship over 3 consecutive academic terms for total of 6 credits.
RESTRICTIONS: Open to students in the M.Ed. in School Leadership program. 24 credits of required coursework in School Leadership program. Must take and submit scores from the School Leadership Licensure Assessment (found at www.ets.org) prior to enrollment.

EDUC 740  LITERACY INSTRUCTION FOR ENGLISH LANGUAGE LEARNERS  3
Focuses on effective literacy instruction for English Language Learners in the elementary and middle school levels in the following areas: language development, vocabulary instruction, decoding, reading fluency, comprehension strategy instruction, and motivation and engagement.
RESTRICTIONS: Open only to students in the M.A. in TESL program and the M.A. in Childhood Foreign Language Education program or with permission of instructor.

EDUC 741  DIVERSITY IN ESL CLASSROOMS  3
Focuses on pedagogical strategies to address the needs of English Language Learners at K-12 and for candidates pursuing the School Library and Cultural Arts focus that optimize learning, cross-cultural communication, student participation, and conflict resolution within diverse classrooms. Field experience included.

EDUC 742  PRACTICUM IN TEACHING ENGLISH AS A SECOND LANGUAGE 3-6
Closely supervised experiences in various school and community settings. Provides the opportunity to develop and practices skills in teaching English as a Second Language to non-native English speakers.
RESTRICTIONS: Requires permission of instructor.

EDUC 744  EDUCATIONAL ASSESSMENT AND PROGRESS MONITORING  3
Course covers measurement, assessment, and reporting of student progress and evaluates instructional expectations. Field experience included.

EDUC 745  COLLABORATIVE TEAMING IN SPECIAL EDUCATION  3
Examines key components of successful teams serving students with special education needs. Skills to be developed include selecting common goals, identifying and solving problems creatively, communicating effectively, and implementing and evaluating education plans that address student, family, and system needs.

EDUC 746  CAPSTONE: INTERN IN SCHOOL LIBRARY MEDIA  1 PF
Capstone experience for candidates pursuing the School Library and Cultural Arts focus. Field experience included.
PREREQ: EDLM621, EDLM622, EDLM625, EDLM628, EDUC602, EDUC603, or permission of instructor.

EDUC 747  TEACHING FOR BETTER THINKING  3
Explores how teachers can enhance the caring, critical and creative thinking dimensions of their classrooms by using appropriate methods and anticipating key challenges. Models the process of building a classroom community of inquiry.

EDUC 749  TEACHING METHODS FOR SECONDARY CLASSROOM  3
Students will examine research-supported best practices in secondary classroom pedagogy from a number of published sources. They will design learning activities for their own classrooms, execute them, and reflect on the student responses.
RESTRICTIONS: Open only to ARCT candidates.

EDUC 750  GRADUATE TEACHING INTERNSHIP  3-9 PF
Full-time extended teaching internship in a classroom setting. Students are under the guidance and supervision of a mentor teacher in the classroom and a University of Delaware supervisor.
PREREQ: Must show evidence of passing Praxis I and complete all other pre-requisite coursework specified in the student’s program requirements. Evidence of passing Praxis II for content area may be required in some programs.
RESTRICTIONS: Requires permission of department. Students must apply for this internship during the academic year prior to their enrollment in the internship. May be repeated up to a total of 9 credits.

EDUC 751  ADV METHODS TCH SECONDARY SCIENCE  3
Intended for students enrolled in the Science concentration of the MAT in Secondary Education, this course focuses on unit planning, lesson evaluation, long-term reflection, and professional practices to enable long-term growth as a teacher.
PREREQ: EDUC696, EDUC641. COREQ: EDUC750. RESTRICTIONS: Open only to students in the MAT in Secondary Education Program.

EDUC 752  ADVANCE MTD/TCH SECONDARY ENGLISH  3
Focuses on unit planning, lesson evaluation, long-term reflection, and professional practices to enable long-term growth as a teacher.
PREREQ: EDUC603 and EDUC604. COREQ: EDUC750. RESTRICTIONS: Open only to students in the MAT in Secondary Education Program.

EDUC 753  SPECIAL EDUCATION INSTRUCTION AND CURRICULUM: INTRODUCTION  3
Foundations of special education instruction and curriculum across the grade levels, including models of instruction, lesson planning, setting instructional goals and objectives, implementing education Programs and instructional adaptations.

EDUC 754  SPECIAL EDUCATION INSTRUCTION AND CURRICULUM: ELEMENTARY  3
Special education instruction and curriculum focused at the K-5 level, including lesson and unit planning, implementing and evaluating instruction and monitoring progress on Individualized Education Programs. Mathematics and content area instruction (social studies, science) are included (K-5).

EDUC 755  EVALUATION MODELS AND APPROACHES  3
Using a case-based approach, the course covers major evaluation models and approaches and their implications for evaluation planning, design, and use.
PREREQ: EDLC604. Crosslisted with EDLC755. RESTRICTIONS: Open only to students in the Masters Plus Certification Program (MPCP) track within the M.Ed. in Exceptional Children & Youth.

EDUC 756  ADVANCED SEMINAR IN EVALUATION  3
The seminar provides the opportunity to study selected areas of evaluation theory and practice in depth. Potential topics include mixed-method evaluation, culturally-responsive evaluation, systems theory for evaluation, evaluation in different sectors (public, private, nonprofit), and others.

EDUC 757  DIAGNOSIS & INSTRUCTION IN LITERACY: GRADES 4-12  3
Focuses on teaching reading and writing to upper elementary and secondary students with disabilities. Reviews foundational concepts about literacy development and problems. Addresses methods of diagnosing literacy problems and instructional methods for decoding, comprehension, and writing, including in content areas the use of assistive technology.

EDUC 761  LITERATURE IN 21ST CENTURY CLASSROOMS  3
Survey of print and digital literature for children and adolescents. Participants will study genre, multimodality, elements, and devices in print-based and digital texts, discuss selection of appropriate texts, and examine techniques for using texts to promote reading. This course is delivered online.

EDUC 762  EXAMINING MULTIMODAL LITERACY  3
CRITICALLY examines complex multimodal digital environments by comparing traditionally printed and digital texts. Students will develop their own multimodal presentations utilizing web-based tools. Strategies for preparing K-12 students to read and write multimodal texts will be explored. This course is delivered online.

EDUC 763  SUPERVISED READING CLINIC: MIDDLE/HIGH  3
Supervised practice in assessing and instructing middle/high school students who struggle with reading and writing. Participants will have opportunities to implement and discuss a wide range of instructional approaches, methods, and materials as they work closely with middle/high school students. This course is delivered online.
PREREQ: EDUC608 and EDUC609 or permission of instructor.

EDUC 765  WRITING STRATEGY INSTRUCTION  3
Theory and research on writing strategy instruction will be explored. The overriding goal will be to learn to use and to develop specific writing strategies to meet individual classroom needs. This course is delivered online.
EDUC 768  COACHING TEACHERS  3
Consistent with IRA standards, introduces teacher study group formats for knowledge building and coaching cycles for formative coaching. Compares and contrasts prominent coaching models and provides tools for building a site-based hybrid model. Includes a practicum project. This course is delivered online.

EDUC 771  DIAG/INSTRUCTION FOR LITERACY PROBS II  3
Second in a two-course sequence designed to prepare teachers to teach reading and writing to students in the elementary and middle grades with a special emphasis on special education students and others with significant literacy problems. Focuses primary attention on vocabulary, comprehension, and composition. A practicum assignment is required.
PREREQ: EDUC 770.

EDUC 772  UNDERSTANDING TEACHER LEADERSHIP  3
Promotes understanding of education standards and self as a leader. Familiarizes candidates with existing literature and research base for teacher leadership.

EDUC 773  ACTION RESEARCH  3
Explores the major tenets of action research and prepares candidates to conduct school-based and classroom-based action research and communicate findings of research to multiple stakeholders.

EDUC 774  DESIGNING PROFESSIONAL DEVELOPMENT  3
Contributes to the understanding of professional development and its impact on pupil learning. Supports monitoring and assessment of professional development impact.

EDUC 775  FOUNDATIONAL SKILLS IN STANDARDS INTEGRATION  3
Prepares teacher-leaders with the foundational skills needed to interpret changing educational standards and to design curriculum and instruction that is aligned with these standards.

EDUC 776  PROMOTING EQUITABLE SCHOOLS  3
Explores how schooling structures, practices and policies produce or resist educational equity for diverse families, cultures and communities. Identifies challenges and opportunities at the classroom and school-wide levels to engage families and communities in efforts to provide equitable opportunities and outcomes for all students.

EDUC 777  FOSTERING TECHNOLOGY BASED COLLABORATION  3
Uses knowledge of existing and emerging technologies to guide colleagues in helping students skillfully and appropriately navigate the universe of knowledge available on the Internet, use social media to promote collaborative learning, and connect with people and resources around the globe.

EDUC 802  READING DEVELOPMENT AND INSTRUCTION  3
Seminar designed to develop broad understanding of theory and research in reading relevant to educational settings. Addresses cognitive development, learning, motivation, assessment, and instruction with a special focus on struggling learners.

EDUC 804  FOUNDATION OF LEARNING SCIENCES  3
The contributions of different theoretical perspectives and research paradigms that characterize the interdisciplinary Learning Sciences field are addressed. Research on learning and thinking in different content areas, cultures, and contexts and the practical and pedagogical implications of evidence-based claims about how people learn are explored.

EDUC 805  PROSEMINAR IN EDUCATION I  3
Required first-year seminar introduces PhD students to key domains of education research examined from the perspective of qualitative data collection methods and analyses. Topics include school reform, social contexts of education, teacher education, learning and development, and curriculum and instruction.
COREQ: EDUC850. restrictions: For first year PhD students only.

EDUC 806  PROSEMINAR IN EDUCATION II  3
Required first-year seminar presents PhD students with key domains of education research and dominant quantitative research designs and statistical procedures used to investigate these domains. Topics include curriculum and instruction, social contexts of education, school reform, learning, development, and psychological foundations of education.
PREREQ: EDUC805. COREQ: EDUC856. restrictions: For first year PhD students only.

EDUC 807  WRITING DEVELOPMENT AND INSTRUCTION  3
Seminar designed to develop broad understanding of theory and research in writing relevant to educational settings. Addresses cognitive development, learning, motivation, assessment, and instruction with a special focus on struggling learners.

EDUC 808  INTERNSHIP IN EDUCATION  3
RESTRICTIONS: Requires permission of department. Credit during any semester varies according to the percentage of time spent in internship. May be repeated up to nine credits.

EDUC 810  MODELS AND PRACTICES OF INSTRUCTIONAL LEADERSHIP: PK-12  3
Intended for PK-12 educators in leadership positions, including teachers in leadership roles. Develops knowledge and skills for planning, managing, improving and evaluating PK-12 instructional programs.
RESTRICTIONS: Ed.D. majors only.

EDUC 811  TOPICS IN EDUCATIONAL POLICY  3
In depth examination of select topics that reflect the expertise of the instructor, and build on the themes introduced in EDUC875, Introduction to Educational Policy.

EDUC 814  PSYCHOLOGICAL ASSESSMENT OF CHILDREN  3
Assessment techniques used to evaluate the social, emotional and behavioral well-being of children and adolescents. Provides instruction and experience in selecting, administering and interpreting psychological tests; the use of classification systems for defining learning, behavioral, and emotional problems in public schools; training in report writing and the development of educational recommendations.
RESTRICTIONS: Requires permission of instructor and program area.

EDUC 815  DESIGN OF LEARNING ENVIRONMENTS  3
Issues in designing and evaluating learning environments, including those that are technological in nature, that foster deep learning, thinking, and reasoning for a variety of learners (e.g., teachers, P-16 learners, nurses, medical residents) in formal and informal settings.

EDUC 816  SEMINAR: LITERACY PROBLEMS  3
Addresses the complex process of literacy development and explores the range of problems that can occur. Special attention devoted to how literacy development is affected by instructional methods, biological factors, and demographic factors such as poverty, ethnicity, and school location.
PREREQ: EDUC609 or equivalent. restrictions: Open only to doctoral level and advanced master's students.

EDUC 817  INDIVIDUAL INTELLIGENCE TESTING  3
Administration and interpretation of major individually administered intelligence tests used in school and child clinical psychology. Five tests will be highlighted: the Stanford Binet, EISC-R, WPPSI, WAIS-R and K-ABC.
RESTRICTIONS: Requires permission of instructor.

EDUC 818  EDUCATIONAL TECHNOLOGY FOUNDATIONS  3
Overview of the following topics related to planning and using educational technology: instructional technology models; internet resources; web design; networking and database fundamentals; educational technology standards; technology integration strategies; assessment and evaluation; societal, legal and ethical issues; and collaborative planning of technology programs.
EDUC 819 DISCIPLINARY KNOWLEDGE/LEARNING SCIENCES 3
The structure of the discipline (e.g., language and literacy, reading, math, science) is used to consider how instruction should be designed in the disciplines in light of the theories and the learning environments we create.

EDUC 820 CONTEXTS FOR LEARNING 3
Course considers how contexts shape learning in informal and formal education settings. Implications for cognition and instructional design will be evaluated from a cross disciplinary perspective.

EDUC 821 COGNITION AND INSTRUCTION 3
Current approaches to the analysis of instruction and schooling. Topics include teacher decision making and effectiveness, classroom processes, instructional methods and design, models for schooling and theories of school-based learning. RESTRICTIONS: Open only to Ph.D. students in education. Requires permission of instructor.

EDUC 822 CRITICAL ISSUES IN LITERACY DEVELOPMENT 3
Explores current issues regarding policy, curriculum and instruction, assessment, professional development, and theory in literacy and special education. Examines literacy policy, readings, and current controversies. Includes a focus on federal legislation (both in general and special education) and national reform efforts.

EDUC 823 LEARNING AND DEVELOPMENT 3
The study of contemporary theory and research in human development, with an emphasis on issues of educational significance, and mechanisms that affect development. May be crosslisted with PSYC282.

EDUC 824 EFFECTIVE COMMUNICATION FOR LEADERSHIP IN EDUCATION 3
Focuses on improving communication skills in the exercise of leadership in administrative and policy settings in education. RESTRICTIONS: Open only to Ed.D majors.

EDUC 825 PROSEMINAR: SOCIAL AND URBAN POLICY 3
Social policy attempts to promote the well-being of individuals, families and communities through public action. Explores efforts to address social and economic problems in urban society. Considers differential policy impacts by social class, race/ethnicity, gender and age. Topics: welfare, housing, social security, health, education, criminal justice and employment. Crosslisted with UAPP282.

EDUC 826 MIXED METHODS IN SOCIAL SCIENCE RESEARCH 3
Explores the theoretical, conceptual and procedural issues in mixed methods approaches to research in education and the social sciences. Emphasis is placed on students’ application of mixed methods to real research and evaluation problems.

EDUC 827 ANALYSIS OF SECONDARY DATA FOR DECISION MAKING 3
Emphasizes the analysis of secondary data sources using quantitative methods for planning and decision-making in educational contexts.

EDUC 828 RESEARCH IN EDUCATIONAL DECISION MAKING 3
Focuses on the research methods used for the purpose of evaluating educational research and the use of research in educational decision-making.

EDUC 829 RESEARCH ON TEACHING 3
A survey of scientific studies of classroom teaching. Teacher characteristics, teaching methods, learning environments, models of teaching, research methods and results of recent research.

EDUC 830 CONSULTATION AND INTERVENTION: SCHOOL DISCIPLINE 3
Surveys the major theoretical approaches and research related to consultation and intervention involving the school-age child. Provides skills in consultation and intervention techniques employed by school psychologists, counselors and other professionals working with teachers, parents and administrators. RESTRICTIONS: Restricted to School Psychology students.

EDUC 831 ADVANCED COUNSELING TECHNIQUES WITH CHILDREN AND ADOLESCENTS 3
The application of brief therapy techniques with children and adolescents from diverse backgrounds. Attention is given to a solution-focused perspective and specific intervention strategies for frequently encountered school problems. PREREQ: EDUCG63. COREQ: EDUCG71. RESTRICTIONS: Requires permission of instructor.

EDUC 832 ADVANCED PRACTICUM IN SCHOOL PSYCHOLOGY 3-12
Students will work in school, clinic or community settings under supervision to further develop their applied skills. RESTRICTIONS: Permission of instructor; enrollment limited to PhD students in school psychology or closely related field of study.

EDUC 833 RESEARCH/THEORY OF MATH LEARNING 3
Examines research and theories of mathematics learning. Traces development of mathematical thinking from grades K to 12. Examines factors that influence the nature of what and how mathematics is learned.

EDUC 834 RESEARCH/THEORY OF MATH TEACHING 3
Examines research and theories of mathematics teaching in grades K-12. Explores components of classroom teaching, relationships between methods of teaching and students’ learning, and the factors that influence the selection of teaching methods. PREREQ: EDUCB33 or permission of instructor.

EDUC 835 RESEARCH/THEORY OF MATH CURRICULUM 3
Examines research and theories of mathematics curricula, grades K-12. Analyses features of traditional and reform curricula, and issues of curricula design and implementation.

EDUC 836 RESEARCH/THEORY OF MATH TEACHER EDUCATION AND SCHOOL IMPROVEMENT 3
Examines research and theories of mathematics teacher education and school improvement, grades K-12. Studies factors that influence the effectiveness of mathematics teacher education programs and factors that support teacher learning in schools. PREREQ: EDUCB33 or permission of instructor.

EDUC 838 RESEARCH ISSUES IN MATH EDUCATION 1 PF
Examines current issues in mathematics education from methodological and conceptual perspectives. Design and critique local research projects. PREREQ: Admission to doctoral program.

EDUC 839 EDUCATION POLICY AND GOVERNANCE 3
Focuses on the structure of educational policy, governance, and law, with emphasis on the policy process, politics of education, and policy implementation.

EDUC 840 RESEARCH COLLOQUIUM IN EDUCATION 1-3 PF
A detailed analysis of the research currently under way at the University of Delaware and other institutions, including doctoral dissertations, that has application to human learning in an educational environment. RESTRICTIONS: Open to Ph.D. and advanced master’s students.

EDUC 841 CONSULTATION AND INTERVENTION: MENTAL HEALTH 3
Advanced theories of consultation (e.g. Mental Health, Conjoint Behavioral Consultation) through discussion and application in the schools. Crisis intervention and conducting a school needs assessment with emphasis on individual and systems level consultation and intervention. PREREQ: EDUCB30. RESTRICTIONS: Requires permission of instructor.

EDUC 842 ASSESSMENT OF SPECIAL POPULATIONS 3
Methods of assessing the needs and strengths of young children, ages birth to 5, and children with low incidence disabilities (including physical, cognitive, and sensory). Planning interventions that include progress monitoring within a response to intervention model. RESTRICTIONS: Requires permission of instructor.

EDUC 843 PROSEMINAR IN SCIENCE EDUCATION 3
Covers critical issues in curriculum, research on learning and teaching. RESTRICTIONS: Topics vary. May be repeated for credit.

EDUC 846 COLLECTION & ANALYSIS OF DATA FOR DECISION MAKING 3
Emphasizes the collection and analysis of qualitative and survey data for planning and decision-making in educational contexts.

EDUC 847 POSTSECONDARY STUDENT AFFAIRS ISSUES AND MANAGEMENT 3
Intended for higher education professionals in leadership positions. Covers student affairs issues, co-curricular programming, and related public relations. RESTRICTIONS: Open only to Ed.D. majors.

EDUC 848 SEMINAR IN LANGUAGE DEVELOPMENT 3
Covers aspects of semantic, syntactic and phonological development through examination of current research and theory in the field. Treats educational implications of language development. May be crosslisted with CGSC848, LING848.
EDUC 849  GOVERNANCE, PLANNING, AND FINANCE IN HIGHER EDUCATION 3
Program development, planning, budgeting, and management in higher education settings; resource acquisition; alumni/trustee relations.
REQUIREMENTS: Open only to Ed.D. majors.

EDUC 850  QUALITATIVE RESEARCH IN EDUCATIONAL SETTINGS 3
Theory and practice are combined as students critique exemplary qualitative studies, explore theoretical frameworks and conduct short-term field research activities designed to develop students' capacity to collect and analyze qualitative data. First part of a two-semester introduction to qualitative research.

EDUC 852  CRITICAL AND INTERPRETIVE METHODS IN EDUCATION RESEARCH 3
Introduction to non-social science approaches to educational inquiry such as philosophy, history, legal studies and others. Stresses epistemological and normative assumptions underlying education research programs. Selected relevant controversies are examined.

EDUC 853  TOPICS: CULTURALLY RELEVANT PEDAGOGIES 3
Focuses on diverse theories and practices and investigates the role of multiple communities and cultures in establishing relevant and responsive pedagogies. Specific topics change each semester/year.

EDUC 854  TOPICS: EQUITY IN EDUCATION 3
Examines the complex ways that educational (in)equity is produced, negotiated, and contested across educational settings and within broader political, economic, social and historical contexts. Specific topics change each semester/year.

EDUC 855  TOPICS: SOCIOCULTURAL THEORIES OF EDUCATION 3
Provides theoretical frameworks for examining the complex ways in which cultural, societal, community, and institutional practices and policies continually shape the processes of teaching and learning across a variety of formal and nonformal educational settings. Specific topics change each semester/year.

EDUC 856  INTRODUCTION TO STATISTICAL INFERENCE 3
Quantitative analysis topics include describing univariate and bivariate data distributions, calculating and interpreting summary statistics, the logic of least squares estimation, the rudiments of probability theory, selected probability models and their interrelationships, the logic of null hypothesis testing, interval estimation and selected inferential techniques.
REQUIREMENTS: EDUC665 or equivalent. REQUIREMENTS: Requires admission to doctoral program.

EDUC 857  PREPARING TO TEACH EDUCATION OR RELATED COURSES IN ACADEMIA 3
Designed for graduate students planning on becoming university professors who must meet the SOE teaching requirement. Design or redesign a course, teach lessons from the course in form of micro-teaching, and discuss issues pertaining to academic life.
REQUIREMENTS: Open to doctoral students in CEHD; otherwise instructor permission required.

EDUC 858  ADVANCED QUALITATIVE RESEARCH METHODS 3
Designed for advanced graduate students who plan to use qualitative methods in their dissertation. Focus on theoretical frameworks, computerized data analysis strategies, and writing techniques. Students are expected to come to class already having completed some data collection.
REQUIREMENTS: Successful completion of a graduate level introductory qualitative research course. REQUIREMENTS: Doctoral students or advanced master's students only.

EDUC 859  ETHNOGRAPHIC RESEARCH 3
Ethnographies provide descriptive and interpretive analyses of cultural practices and social organization in everyday settings. Students in this course learn how to conduct ethnographic fieldwork. Students formulate research questions act as participant-observers, write field notes, interview participants and conduct rudimentary data analysis. Students also discuss dilemmas faced by ethnographic researchers.

EDUC 860  CURRICULUM THEORY 3
Introduces curriculum theory and the history of curriculum as a field of study. Topics include societal forces influencing curriculum, assumptions underlying curriculum decisions and conflicting views of curriculum.

EDUC 862  DESIGN AND ANALYSIS OF EXPERIMENTS 3
Intermediate topics in the design of experiments and quasi-experiments, including analysis of variance, factorial designs, analysis of covariance, repeated measures, non-parametric statistics and selected multivariate techniques. Organized by the Campbell-Stanley framework for planning and critiquing experimental efforts.
REQUIREMENTS: EDUC665 or equivalent. REQUIREMENTS: Requires admission to doctoral program. Offered once every two years.

EDUC 863  PROGRAM EVALUATION IN EDUCATION 3
Focuses on models, theories and practice of program evaluation and applied research in education. Topics include experimental and quasi-experimental designs, validity, political and ethical issues of evaluation and the implementation and practice of process and outcome program evaluation.
REQUIREMENTS: EDUC827, EDUC665, or equivalent introductory statistics course; and EDUC846, EDUC850 or equivalent introductory qualitative methods course.

EDUC 865  EDUCATIONAL MEASUREMENT THEORY 3
Focuses on both classical and modern test theory including scaling, scoring, reliability, validity, generalizability theory, bias, item analysis, item response theory and equating with applications to norm-referenced and criterion-referenced assessment frameworks.
REQUIREMENTS: EDUC665 or equivalent.

EDUC 868  RESEARCH 1-6

EDUC 869  MASTER'S THESIS 1-6

EDUC 870  CHILD NEUROPSYCHOLOGY 3
Examines approaches to neuropsychological assessment and application to childhood learning and neurodevelopmental disorders.
REQUIREMENTS: Requires permission of instructor.

EDUC 872  ADVANCED EDUCATIONAL MEASUREMENT 3
Focuses on theories of measurement with special emphasis on item response theory. The first two classes will be devoted to classical test theory and remaining class sessions will emphasize item response theory.
REQUIREMENTS: EDUC856 and EDUC865.

EDUC 873  MULTILEVEL MODELS IN EDUCATION 3
Introduction to multilevel modeling. Considers the analysis of growth and change as a special case of multilevel modeling.
REQUIREMENTS: EDUC812 and EDUC856, or equivalent.

EDUC 874  APPLIED MULTIVARIATE DATA ANALYSIS 3
Introduces applied use of multivariate models of data analysis. Topics include multiple regression, logistic regression, discriminant function analysis, MANOVA, and exploratory factor analysis.
REQUIREMENTS: Graduate level general statistics course.

EDUC 876  LATENT VARIABLES FOR EDUCATIONAL RESEARCH 3
Introduces models for latent variables with applications to educational and social science research. Topics divided into models for continuous and categorical latent variables. Continuous latent variables models include confirmatory factor analysis, structural equation modeling, and growth curve modeling. Models for categorical latent variables include latent class analysis and latent Markov chain modeling. Advanced methods such as latent transition analysis and general growth mixture modeling are also covered.
REQUIREMENTS: EDUC812 or equivalent.

EDUC 879  INTERNSHIP IN EDUCATION 3-9
Supervised, on-the-job experience in one specific area of education (i.e., administration), in which such internships are required as a part of graduate degree programs.
REQUIREMENTS: Students are required to complete 120 hours during the final 3 credits of the 6 credit internship to earn the 3 credits. Internship placements must be approved by the instructor.

EDUC 880  EDUCATION LEADERSHIP PORTFOLIO I 4 PF
Focuses on identifying focus of inquiry of the portfolio, including a problem statement and set of artifacts that reflect different approaches to addressing the problem.
REQUIREMENTS: Completion of all required Ed.D. core courses and electives.
REQUIREMENTS: Restricted to Ed.D. students.

EDUC 881  EDUCATION LEADERSHIP PORTFOLIO II 4 PF
Focuses on completing a set of artifacts that reflect different approaches to addressing the focus of inquiry.
REQUIREMENTS: Completion of all required Ed.D. core courses and electives and successful completion of EDUC 864 (880). REQUIREMENTS: Restricted to students in the Ed.D. program.
EDUC 882  EDUCATION LEADERSHIP PORTFOLIO III  4  PF
Focuses on completing a set of artifacts that reflect different approaches to addressing the focus of inquiry and a final reflection essay.
PREREQ: Completion of all required Ed.D. core courses and electives and successful completion of EDUC 864 (880) and EDUC 871 (881). RESTRICTIONS: Restricted to students in the Ed.D. program.

EDUC 883  ADMINISTRATION OF ADULT AND POSTSECONDARY EDUCATION PROGRAMS  3
Considers the administration, design and implementation, and evaluation of programs for postsecondary students in formal and informal training, degree or nondegree programs. Will consider factors influencing the administration and design of programs such as institutional demands.

EDUC 885  EDUCATIONAL TECHNOLOGY TOPICS  3-6
In-depth study of a major problem in educational technology.
RESTRICTIONS: May be repeated for credit when topics vary.

EDUC 888  DOCTORAL INTERNSHIP IN SCHOOL PSYCHOLOGY  3-6
Full-time internship in school settings under supervision. Final field-based experience for doctoral students in which they integrate and apply skills learned throughout their course of study.
RESTRICTIONS: By permission of instructor only; enrollment limited to school psychology PhD students who have completed their course work.

EDUC 890  LEADERSHIP: THEORY AND RESEARCH  3
Theories and research relating to leadership and management style. Fundamental principles of leadership as viewed from the fields of philosophy, sociology, psychology and applied behavioral science are discussed. Emphasis on analysis of personal style.

EDUC 891  ORGANIZATIONAL PROBLEM ANALYSIS AND PLANNING IN EDUCATION  3
Focuses on the theory, research, and practice of organizational change and problem-solving in educational contexts.

EDUC 897  CURRICULUM PLANNING AND DESIGN  3
Focuses on the planning, design, and delivery of curriculum in diverse educational settings.

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

EDUC 969  DOCTORAL DISSERTATION  1-12  PF

ENGINEERING GRAPHICS & GENERAL

EGG 101  INTRODUCTION TO ENGINEERING  2
Introduction to profession, including disciplines of chemical, civil, computer, electrical, environmental, and mechanical engineering. Prepares students for success through integration of: technical problem solving and engineering design, ethical decision-making, teamwork, and communicating to diverse audiences.

EGGG 288  NANOTECH IN THE NEWS  3
Provides an exposure to nanotechnology and engineering as it impacts daily life. Based on current topics in the news, we discuss the underlying science in an approachable manner and consider the relevant societal, economic, and ethical issues. Students will leave with a greater understanding of the emerging technologies that shape our society. Crosslisted with MSEG288.

ELEG 205  ANALOG CIRCUITS I  4
Laws of the electric circuit, analysis of DC and AC circuits, network equations and network theorems.
PREREQ: MATH242 and PHYS207

ELEG 298  ECE DESIGN CHALLENGES  3
Course includes a series of learning modules including electrical safety, use of test equipment, and interfacing microprocessors to sensors. Students complete a design assignment. May be crosslisted with CPEG298. PREREQ: ELEG205, CPEG222.

ELEG 302  INTRODUCTION TO DEVICES AND MATERIALS  3
Emphasizes concepts and properties of materials important in modern solid state electronics; topics include structure and processing of electrical materials, band structure, carrier concentration and dynamics, junction phenomena and optical and magnetic phenomena.
PREREQ: MATH243 and PHYS208

ELEG 303  ELECTRICITY FROM SUNLIGHT  3
Introduction to generating electricity with solar energy, such as the photovoltaic system on the University Field House. Course content is directed to non-electrical engineering undergraduate students. Students pursuing degrees in the basic sciences, business, accounting, education and other engineering fields would all benefit.
PREREQ: MATH221 or MATH241.

ELEG 305  SIGNALS AND SYSTEMS  3
Introduction to signals and systems, with an emphasis on time and frequency characterization of linear, time-invariant systems. Covers discrete and continuous time systems, sampling, and Fourier, Laplace, and Z transforms. Application examples include medical imaging, radar, audio and image processing, virus delivery protocols, and biological networks.
PREREQ: MATH242.

ELEG 306  DIGITAL SIGNAL PROCESSING  3
Course topics include z-transforms, the discrete Fourier transforms (DFT), the fast Fourier transform (FFT), signal and linear time invariant (LTI) system frequency analysis, sampling and reconstruction of signals, implementation of discrete-time systems, digital filter design, and multirate signal processing.
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, multi-transistor circuits and feedback.
PREREQ: ELEG205

ELEG 310  RANDOM SIGNALS AND NOISE  3
Introduction to probability and estimation as applied to random signals and noise. Includes random variables, densities, distributions, random processes, spectral representations and statistics.

ELEG 312  ELECTRONIC CIRCUIT ANALYSIS II  4
Low-frequency and high-frequency response of AC-coupled amplifiers, Class A tuned amplifiers, tuned power amplifiers, frequency response and stability of feedback amplifiers, oscillators, modulation and demodulation circuits.
PREREQ: ELEG309

ELEG 313  ELECTROMAGNETIC FIELD THEORY  3
Explores time-independent and time-dependent properties of electric and magnetic fields leading to the vector formulation of Maxwell's Equations and the derivation of electro-magnetic waves in vacuum and in material media. Discover the electromagnetic properties of waves including propagation, power flow, polarization, transmission lines, waveguides and an introduction into antennas.
PREREQ: PHYS208, and MATH243, and ELEG205. COREQ: MATH351.

ELEG 320  FIELD THEORY I  4
Study of theory and problems in electrostatic and magnetostatic fields. Maxwell's equations.
PREREQ: PHYS208, ELEG205 and MATH243. COREQ: MATH351.

ELEG 340  SOLID STATE ELECTRONICS  3
Introduction to concepts necessary to establish electronic phenomena in solids. Application to electronic devices such as diodes, transistors, FETS and integrated circuits. Emphasis on reduction of physical device to circuit model.
COREQ: MATH342

ELEG 366  INDEPENDENT STUDY  1-6

ELEG 398  ECE DESIGN & ENTREPRENEURSHIP  3
Students work in small teams on various design challenges. The teams explore entrepreneurship opportunities by forming fictitious companies and selling their ideas. May be crosslisted with CPEG398. PREREQ: ELEG298.

ELEG 403  COMMUNICATION SYSTEMS ENGINEERING  3
Examines the basics of modern communications systems, including analog modulation, digital data transmission, random processes and spectral analysis, and the performance of these systems in the presence of noise.
PREREQ: ELEG305 and ELEG310, or permission of instructor.
ELEG 404 DIGITAL IMAGE AND AUDIO SIGNAL PROCESSING 3
Introduction to digital image and audio signal processing. Sensor devices capturing energy across the electromagnetic spectrum provide a rich gamut of images that can be processed digitally for a myriad of applications including medical, surveillance, remote sensing, hyperspectral imaging, and consumer electronics. Provides the fundamental mathematical tools for image analysis covering topics in sampling, visual perception, color spaces, Fourier analysis and representation, unitary transforms, wavelet transforms, noise reduction and restoration, computer tomography, compression. Introduction to the analysis and processing of audio and music signals. PREREQ: ELEG305.

ELEG 413 FIELD THEORY II 3

ELEG 414 BASIC ELECTRICAL MACHINES AND POWER 1
Provides a basic understanding of electrical machines, including motors and generators, and electrical power, to a non-electrical engineer, starting from basic physical principles. Knowledge of elementary calculus and vectors is required. RESTRICTIONS: No ELEG or CPEG majors may take this course.

ELEG 415 ELECTRIC POWER AND RENEWABLE ENERGY SYSTEMS 3
Introduction to electric power systems and interfaces with renewable energy sources. Covers electric power generation, transmission, distribution, residential, commercial, and industrial systems; components, operation, losses, metering and load management.

ELEG 417 THE SMART GRID 3
An examination and analysis of smart grid technologies, applications, and transformational impacts on the electric utilities. Topics include smart grid fundamentals, objectives, technologies (power, communications and information), architectures, applications, evolution, and implementation challenges. PREREQ: MATH242. RESTRICTIONS: Juniors or Seniors only.

ELEG 418 DIGITAL CONTROL SYSTEMS 3
Study of closed-loop analog and digital control systems. Stability and performance analysis in time and frequency domains. Frequency and state-space design methods, including root-locus methods, Bode and Nyquist methods, and pole placement using Ackermann's formula. Computer-aided simulation and design uses MATLAB and SIMULINK. PREREQ: ELEG305 or permission of instructor.

ELEG 419 MULTIMEDIA COMMUNICATIONS 3
The theory and principles of multimedia communications, including data compression, CD-ROMs, multimedia networking and standards (JPEG, MPEG, H261, H263, RTP, etc.).

ELEG 422 SEMICONDUCTOR MATERIALS PROCESSING 3
The basic goals, principles and techniques of semiconductor materials processing are discussed. Emphasis is on physical explanations of how devices and processes work rather than on elaborate mathematical models.

ELEG 423 ELECTRICAL PROPERTIES OF MATTER 3
Provides basic understanding of electronic behavior in materials used for fabricating semiconductor devices. Introduces fundamentals of electron theory; elementary quantum mechanics (as applied to semiconductors); concept of energy bands; electronic behavior in crystals; electrical conduction in metals, alloys, semiconductors and insulators; metal-semiconductor contacts and metallization. PREREQ: ELEG340.

ELEG 424 QUANTUM MECHANICS I 3
First in a sequence with PHYS425 that provides introduction to basic principles and applications of quantum mechanics. Emphasis on formalism of quantum mechanics. Schrodinger equation is solved for simple cases such as free-particle motion, simple harmonic oscillator and hydrogen atom, with a basic treatment of angular momentum. Topic of identical particles also considered. Crosslisted with PHYS424. PREREQ: MATH341 or MATH302 or MATH349.

ELEG 425 CHARACTERIZATION OF ELECTRONIC MAT AND DEV 3
Focus on the fundamentals and practical considerations of the myriad techniques which are used to characterize electronic materials. Explore the theoretical underpinnings of the techniques and discuss applicability and limitations. Crosslisted with MSEG422.

ELEG 426 PHOTONIC CRYSTAL DEVICES 3
Introduces design and fabrication techniques required for photonic crystal structures. Begins with working knowledge of basic operation physics and introduces mathematical and computational methods for their design. Various fabrication methods discussed such as lithographic and self-assembly methods. PREREQ: ELEG320.

ELEG 427 TERAHERTZ AND MILLIMETER-WAVE LIGHT GENERATION AND DETECTION 3
Light is treated as an antenna phenomenon at radio wavelengths and a quantum effect near the visible. At terahertz frequencies and millimeter-wavelengths, these distinctions are blurred and both technologies exist. These technologies are described and a unified view of their principles is provided. RESTRICTIONS: Students should be knowledgeable of electronic circuit theory and have some electromagnetics background.

ELEG 437 ENERGY SYSTEMS 3
Energy flows are examined in our society including all sources, conversions and conversion efficiencies, and end uses. Both existing and alternative energy sources are presented, especially with regard to total resource availability. Thermodynamics of conversion efficiency is covered, as well as efficiency measures available in end use. PREREQ: MATH241.

ELEG 438 THEORY AND DESIGN OF DIFFRACTIVE OPTICS 4
Applications of Fourier analysis to diffraction, imaging optical data processing and holography. Major design project required. PREREQ: ELEG305.

ELEG 440 OPTO-ELECTRONICS 3
Provides an introduction to the operating principles of optoelectronic devices used in various digital transmission and information processing systems. Emphasis is on the generation (via lasers) and detection of optical signals. PREREQ: Senior standing with completion of all core physics and math courses required or permission of instructor.

ELEG 441 ANTENNA THEORY AND DESIGN 3
The radiation characteristics of antennas, numerical and analytical antenna analysis methods and design techniques for many types of antenna. Topics include wire antennas, antenna arrays, broadband antennas and microstrip antennas. PREREQ: ELEG320.

ELEG 445 OPTICAL COMMUNICATION SYSTEMS 3
Studies the components and system design issues of fiber optic based communications systems. Topics include the propagation of lightwaves in fibers, the coupling of light into fibers, a review of sources and detectors used in fiber-based systems, link analysis, and overall architecture issues. PREREQ: ELEG440 or permission of instructor.

ELEG 446 NANOELECTRONIC DEVICE PRINCIPLES 3
Introduction to the operating principles of nanoscale optical and electronic devices, with emphasis on how nanotechnology and quantum mechanics affect devices with reduced size and dimensions. Develops the performance and limitations of devices based on quantum well, wires, dots, and nanophase materials.

ELEG 447 OPTICAL PROPERTIES OF SOLIDS 3
Techniques for the design of optical filters and optoelectronic devices with thin films and the fundamental electromagnetic and solid state physics that determine the optical properties of solids. RESTRICTIONS: Students should have some electromagnetics and solid state physics background.

ELEG 450 SEMICONDUCTOR DEVICE DESIGN AND FABRICATION 4
Instruction in design and fabrication of semiconductor devices and circuits. Specific topics include photolithography and mask design, diffusion, etching, metallization, metrology, and device testing. The laboratory component of this course will focus on the design, fabrication, testing, and reporting of basic devices in silicon and/or compound semiconductors. Students will work in small teams.

ELEG 454 MOBILE NETWORKING AND COMPUTING 3
Contemporary topics in mobile networking and computing are covered. Topics vary and can include ad hoc networking, sensor networking, localization, mobile+cloud computing, multimedia, user behavior, mobile+social applications, energy-aware computing, and mobile application APIs on Android systems. Project-based course and requires students to develop programs for platforms such as Android-based devices. PREREQ: CISC220 or CISC181 or similar course in C++ or Java. ELEG458 is a complementary class that students might find useful to take at the same time as this course.

ELEG 455 HIGH-PERFORMANCE COMPUTING WITH COMMODITY HARDWARE 3
New commodity computing devices, e.g., GPUs, bring the originally elite high performance computing into the reach of general public. Principles of program optimization, GPU and IBM Cell architecture, along with concepts and techniques for optimizing general purpose computing on the new hardware. May be crosslisted with CPEG455.
ELEG 456  ELECTRIC POWER II  3
This is the second course in electric power systems. This course covers the
construction materials and design principles of indoor and underground three
phase low and high voltage electric power systems, system economics, reliability,
load characteristics, load management, and metering.
PREREQ: ELEG415.

ELEG 457  SEARCH AND DATA MINING  3
With the increasing amount of textual information, it is important to develop
effective search engines, such as Google, to help users manage and exploit the
information. Examine the underlying technologies of search engines and get
hands-on project experience. Requires good programming skills.
May be crosslisted with CPE457.

ELEG 458  ADVANCED MOBILE SERVICES  3
Foundations for the creation of successful advanced mobile services, including the
interplay of business and technology evolution, methodologies, architectures and
paradigm shifts that accompany the development of converged user-centric
telecommunication services from location sensitive and navigation services,
to social networking and remote sensing.

ELEG 460  HIGH TECHNOLOGY ENTREPRENEURSHIP  3
Focuses on critical financial, legal, scientific and engineering issues confronted
during initial planning stages of a start-up enterprise. Students work in teams to
develop a real-world product offering.
Crosslisted with ENTR460. RESTRICTIONS: Senior status, permission of instructor.

ELEG 465  INTRODUCTION TO CYBERSECURITY  3
This cybersecurity course introduces students to computer and network security and
covers the foundation security policies and methods to provide confidentiality,
integrity, and availability, as well as cryptography, auditing, and user security.
Topics are reinforced with hands-on exercises run in a virtual machine environment.
Crosslisted with CPE465.

ELEG 466  INDEPENDENT STUDY  1-6

ELEG 471  MATHEMATICAL PHYSIOLOGY  3
Mathematical methods in Human Physiology, covering cellular, tissue, organ,
and integrated systems. Dynamic modeling of homeostasis, endocrine regulatory
systems, immune response dynamics, mutation and selection. Mathematical
methods covered include linear and nonlinear differential equations, Lyapunov
analysis, mass action, Hamming spaces, reaction-diffusion equations, and
simulation.
Crosslisted with BMED471. RESTRICTIONS: Seniors only. Requires permission of
instructor.

ELEG 475  IMAGE PROCESSING WITH BIOMEDICAL APPLICATIONS  3
Fundamentals of digital image processing, including image formation, acquisition,
transforms, enhancement, restoration, coding, and reconstruction from
projections. Attention is to biomedical imaging modalities, including X-ray,
computed tomography (CT), magnetic resonance (MR) imaging, and ultrasound.
PREREQ: ELEG305.

ELEG 477  BIO SIGNAL PROCESSING  3
Biomedical signal characteristics, biomedical systems and models, applications of
Fourier transform, wavelet transforms, and joint-time frequency analysis of
biomedical signals. Systems studies include ultrasounds, EKG’s, CAT scans, MRI’s,
X-rays, and others.
PREREQ: ELEG305, ELEG310, or equivalent

ELEG 478  INTRODUCTION TO NANO AND BIOPHOTONICS  3
Multidisciplinary approach covers fundamentals of light-matter interactions and
nano-scaled materials and discusses their use in understanding, characterizing and
manipulating biological systems. Covers several applications including laser
manipulation and dissection, bio-imaging, flow cytometry and biosensors, optical
biopsy and spectroscopy and photodynamic therapy.

ELEG 479  INTRODUCTION TO MEDICAL IMAGING SYSTEMS  3
Physics, instrumentation, system design, and image reconstruction algorithms will
be covered for the following modalities: radiography, x-ray computed tomography
(CT), single photon emission computed tomography (SPECT), positron emission
tomography (PET), magnetic resonance imaging (MRI), and real-time ultrasound.
Crosslisted with BMED479. PREREQ: Requires permission of instructor.

ELEG 482  OPTICS AND PHOTONICS  3
Principles of classical optics and their applications. Topics include wave optics,
material dispersion, geometrical optics, ray tracing, ABCD matrices, birefringence
and Jones’ formalism, Gaussian optics, coherence, interference, diffraction, pulse
propagation and non-linear optics. Specific applications including optical
components and instrumentation, imaging techniques, resonators and Fourier
optics. Apply fundamental principles of optics and interaction between light and
matter (photonic).

ELEG 484  ELECTRIC VEHICLES AND THE GRID  3
This seminar covers design of electric vehicles and charging infrastructure, existing
and needed policies, consumer perspective on electric vehicles, and the use of
electric vehicles for grid services, including leveling variable generation.
Crosslisted with MAST484. PREREQ: Students must have had basic physics or
engineering in order to understand relationships among voltage, current,
resistance, and power.

ELEG 491  ETHICS/IMPACTS OF ENGINEERING  3
A survey of ethical and political issues that arise with computers and information
technology: privacy, free speech, intellectual property, cybercrime, safety and risk,
and professional ethics. Engineering solutions are explored from the standpoint of
design and implementation, with a focus on global impact.
RESTRICTIONS: Open to engineering seniors, or others by permission of
instructor.

ELEG 492  RADAR SYSTEMS AND TECHNOLOGY  3
Introduction of basic RADAR concepts and operational scenarios. The RADAR
range is developed as concepts related to RADAR cross-section, waveform
design, antennas, transmitter and receivers.
PREREQ: ELEG 320, ELEG 305.

ELEG 493  ELECTRIC MOTORS AND GENERATORS  3
This is a basic course in motor and generator performance and application.
Students will learn about electric power and energy, mechanical power and
energy, and the torque, speed, efficiency, and economics of the various motor and
generator designs.

ELEG 494  SYSTEM HARDENING AND PROTECTION  3
Practical treatment of the defensive techniques used to harden computer systems to
make them less vulnerable to cyber-attacks. Defect management, configuration/hardening, account control, logs/auditing, and risk assessment are
covered and reinforced with hands-on exercises run in a virtual machine environment.
Crosslisted with CPE494.

ELEG 495  DIGITAL FORENSICS  3
Introduction to digital forensics as used to analyze criminal evidence in computer
systems and digital media. Forensic tools and techniques for storage and memory
analysis of windows/linux, network traffic, documentation are covered and
reinforced with hands-on exercises run in a virtual machine environment.
Crosslisted with CPE495.

ELEG 496  TOPICS IN CYBERSECURITY  3
Explore varied topics in cybersecurity to coincide with the interests of students
and current faculty. Potential topics include: (1) applications, web or cloud
security, (2) risk management and incident response, (3) malware and reverse
engineering, or (4) wireless, smartphone, or SCADA security.
Crosslisted with CPE496.

ELEG 498  SENIOR DESIGN I  3
Students apply their accumulated classroom knowledge to an electrical and
computer engineering design problem. Students work in small teams and must
present their finished designs at the end of the term.
May be crosslisted with CPE498.

ELEG 499  SENIOR DESIGN II  3
Students apply their accumulated classroom knowledge to an electrical and
computer engineering design problem. Students work in small teams and must
present their finished designs at the end of the term.
May be crosslisted with CPE499.

ELEG 604  DIGITAL IMAGE AND AUDIO SIGNAL PROCESSING  3
Introduction to digital image and audio signal processing. Sensor devices capturing
energy across the electromagnetic spectrum provide a rich gamut of images that
can be processed digitally for a myriad of applications including medical
surveillance, remote sensing, hyperspectral imaging, and consumer electronics.
Provides the fundamental mathematical tools for image analysis covering topics in
sampling, visual perception, color spaces, Fourier analysis and representation,
unitary transforms, wavelet transforms, noise reduction and restoration,
computer tomography, compression. Introduction to the analysis and processing of
audio signals.
PREREQ: ELEG305 ELEG310.
ELEG 606  OCEAN AND ATMOSPHERE REMOTE SENSING  3
Fundamentals of ocean and atmospheric remote sensing including space platforms, their orbits, instruments, data retrieval and image processing methods. Oceanographic and atmospheric applications of remote sensing and new developments in sensors and data analyses. Crosslisted with MAST606.

ELEG 614  BASIC ELECTRICAL MACHINES AND POWER  1
Provides a basic understanding of electrical machines, including motors and generators, and electrical power, to a non-electrical engineer, starting from basic physical principles. Knowledge of elementary calculus and vectors is required. RESTRICTIONS: No ELEG or CPEG majors may take the course.

ELEG 615  ELECTRIC POWER AND RENEWABLE ENERGY SYSTEMS  3
Introduction to electric power systems and interfaces with renewable energy sources. Covers electric power generation, transmission, distribution; residential, commercial, and industrial systems; components, operation, losses, metering and load management.

ELEG 616  STATISTICAL PHYSICS AND THERMODYNAMICS  3
Thermodynamic laws and concepts; thermodynamic potentials, Legendre transformations, and Maxwell relations. Concepts of probability: Statistical mechanics concepts: microstates and macrostates; ensembles; partition functions; connections to thermodynamics. Many particle systems, equations of state, chemical potential, phase equilibrium, phase transitions, Monte Carlo simulations in statistical physics. Crosslisted with PHYS616.

ELEG 617  THE SMART GRID  3
An examination and analysis of smart grid technologies, applications, and transformational impacts on the electric utilities. Topics include smart grid fundamentals, objectives, technologies (power, communications and information), architectures, applications, evolution, and implementation challenges.

ELEG 620  PHOTOVOLTAIC MATERIALS AND DEVICES  3
Progression using solar resource, together with photovoltaic effect, through to modern photovoltaic (PV) modules. Solar cell operation at device level will be covered in detail. The various PV technologies (flat plate, thin film, concentrators, multi-junction, thermal PV) will be briefly surveyed. PREREQ: ELEG340 or equivalent.

ELEG 621  LINEAR SYSTEMS  3
State-space analysis of linear dynamical systems. Solution of state-space equations, and analysis of structural system properties based on eigenvalues and eigenvectors. Similarity transformations and decompositions. Lyapunov stability. Observability and controllability. State feedback control design. Crosslisted with MEE621. PREREQ: MATH349 or MATH351 or graduate status.

ELEG 622  ELECTRONIC MATERIALS PROCESSING  3
Theory and current technology of semiconductor fabrication processes, including crystal growth, wafer preparation, lithography, liquid and vapor phase epitaxy, molecular-beam epitaxy of ultra-thin layers and superlattices, oxide growth, thin-film deposition, diffusion, ion implantation, etching and metallization.

ELEG 625  CHARACTERIZATION OF ELECTRONIC MATERIAL & DESIGN  3
Focus on the fundamentals and practical considerations of the myriad techniques which are used to characterize electronic materials. Explore the theoretical underpinnings of the techniques and discuss applicability and limitations. Crosslisted with MSE622.

ELEG 626  PHOTONIC CRYSTAL DEVICES  3
Introduces design and fabrication tools required for photonic crystal structures. It begins with a working knowledge of their basic operation physics and then introduces mathematical and computational methods for their design. Various fabrication methods are discussed such as lithographic and self-assembly methods. PREREQ: ELEG648

ELEG 627  TERAHERTZ AND MILLIMETER-WAVE LIGHT GENERATION AND DETECTION  3
Light is treated as an antenna phenomenon at radio wavelengths and a quantum effect near the visible. At terahertz frequencies and millimeter-wavelengths, these distinctions are blurred and both technologies exist. These technologies are described and a unified view of their principles is provided. RESTRICTIONS: Students should be knowledgeable of electronic circuit theory and have some electromagnetics background.

ELEG 628  SOLAR ENERGY TECHNOLOGY AND APPLICATIONS  3
Introduces basics of solar cell technology, applications, and systems. Presents critical issues in research, manufacturing, cost and performance. Compares Si wafer and thin film solar technology. Analyzes off-grid, residential, building integrated, centralized power systems. Discusses other solar energy concepts.

ELEG 630  INFORMATION THEORY  3
Information theory establishes the theoretical limits that can be achieved in communications systems, and provides insights about how to achieve these limits in practical systems. Covers lossless and lossy compression, and studies the maximum information rate achievable in communications over noisy channels. PREREQ: Undergraduate course in probability.

ELEG 631  DIGITAL SIGNAL PROCESSING  3
Theory of discrete-time signals and systems with emphasis on the frequency domain description of digital filtering and discrete spectrum analysis, fast Fourier transform, z-transform, digital filter design, relationship to analog signal processing. PREREQ: ELEG305 or equivalent.

ELEG 632  MATHEMATICAL METHODS FOR SIGNAL PROCESSING  3
Provides the mathematical foundation for advanced studies in information processing. In addition, Matlab and Simulink, tools commonly used by electrical and other engineers, are introduced in the context of assisting in solving the mathematical problems. Examines differential equations and matrix and linear algebra. Solution to both linear and non-linear ordinary differential equation are found analytically and with Matlab. For problems without analytical solutions, numerical ones are sought using Simulink. PREREQ: Must be a graduate of an accredited undergraduate engineering program.

ELEG 633  IMAGE PROCESSING  3
Review of concepts of linear systems and spectral analysis, human visual response, scanning and display of images, Fourier optics, image enhancement and feature extraction, design of digital filters for image processing, 2D fast Fourier transform algorithms and computed tomography. RESTRICTIONS: Requires permission of instructor.

ELEG 634  SIGNALS AND SYSTEMS  3
Reviews basic concepts of discrete and continuous time signals, control systems, and linear algebra. Transforms, sampling, aliasing, linear algebra and systems of equations, matrix factorizations, eigenvalues and eigenvectors, least squares, and the Cayley-Hamilton theorem are studied. PREREQ: ELEG305 and MATH342 or MATH349 or equivalents.

ELEG 635  DIGITAL COMMUNICATION  3
The theory and applications of digital communications including modulation, pulse shaping, and optimum receiver design for additive white gaussian noise and bandlimited channels. PREREQ: Undergraduate course in probability, signals and linear systems.

ELEG 636  STATISTICAL SIGNAL PROCESSING  3

ELEG 637  ENERGY SYSTEMS  3
Energy flows are examined in our society including all sources, conversions and conversion efficiencies, and end uses. Both existing and alternative energy sources are presented, especially with regard to total resource availability. Thermodynamics of conversion efficiency is covered, as well as efficiency measures available in the literature. RESTRICTIONS: Freshman level calculus.

ELEG 638  THEORY AND DESIGN OF DIFRACTIVE OPTICS  4
Applications of fourier analysis to diffraction, imaging, optical data processing and holography. Major design project required. PREREQ: ELEG305 and ELEG320.

ELEG 640  OPTO-ELECTRONICS  3
Provides an introduction to the operating principles of optoelectronic devices used in various digital transmission and information processing systems. Emphasis is on the generation (via lasers) and detection of optical signals.

ELEG 641  ANTENNA THEORY AND DESIGN  3
The radiation characteristics of antennas, numerical and analytical antenna analysis methods and design techniques for many types of antenna. Topics include wire antennas, antenna arrays, broadband antennas and microstrip antennas. PREREQ: ELEG320 or ELEG413.

ELEG 645  OPTICAL COMMUNICATION SYSTEMS  3
Studies the components and system design issues of fiber optic based communication systems. Topics include the propagation of lightwaves in fibers, the coupling of light into fibers, a review of sources and detectors used in fiber-based systems, link analysis, and overall architecture issues. PREREQ: ELEG640 or permission of instructor.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ELEG 646</td>
<td>Nanoelectronic Device Principles</td>
<td>3</td>
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<td>Introduction to the operating principles of nanoscale optical and electronic devices, with emphasis on how nanotechnology and quantum mechanics affect devices with reduced sizes and dimensions. Develops the performance and limitations of devices based on quantum wells, wires, dots, and nanophase materials.</td>
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<tr>
<td>ELEG 647</td>
<td>Optical Properties of Solids</td>
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<td>Techniques for the design of optical filters and optoelectronic devices with thin films and the fundamental electromagnetic and solid state physics that determine the optical properties of solids. RESTRICTIONS: Students should have some electromagnetics and solid state physics background.</td>
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<td>ELEG 648</td>
<td>Advanced Engineering Electromagnetics</td>
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<td>Development and application of Maxwell’s equations as they apply to the analysis of guided wave, radiation, and scattering problems. Topics include wave propagation, reflection and transmission, vector potentials, transmission lines and cavities, and special emphasis on antennas and scattering structures.</td>
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<td>ELEG 650</td>
<td>Semiconductor Device Design and Fabrication</td>
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<td>Instruction in design and fabrication of simple bi-polar and MOS integrated circuits. Specific topics include semiconductor device and integrated circuit design, photolithographic mask design and fabrication, photolithography, H-diagnosis and P-diagnosis, P-MOS, metallization, and device and integrated circuit testing. PREREQ: ELEG340</td>
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<tr>
<td>ELEG 651</td>
<td>Computer Networks II</td>
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<td>Foundation principles, architectures, and techniques employed in computer and communication networks. Focuses on mechanisms used in TCP/IP protocol suite. Topics include connection management, end-to-end reliable data transfer, sliding window protocols, quality of service, flow control, congestion control routing, LANs, framing, error control, analog versus digital transmission, packet versus circuit switching, multiplexing. Crosslisted with CISC650. PREREQ: An undergraduate level course in computer architecture and operating systems. RESTRICTIONS: Knowledge of probability and statistics recommended. Credit cannot be received for CISC650 and any of the following courses: CIS250, CPEG419, CIS450, ELEG651.</td>
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<tr>
<td>ELEG 652</td>
<td>Principles of Parallel Computer Architectures</td>
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<td>Provides an introduction to the principles of parallel computer architecture. Begins at a level that assumes experience in introductory undergraduate courses such as digital system design, computer architecture, and microprocessor based systems. May be crosslisted with CPEG652.</td>
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<tr>
<td>ELEG 653</td>
<td>Computer System Security</td>
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<td>Surveys current topics in computer network security, including technology to protect networks, protocols and applications from intrusion and theft. Topics include techniques for authentication, privacy, denial of service and non-repudiation. PREREQ: ELEG651 or CISC650 or permission from the instructor</td>
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<tr>
<td>ELEG 654</td>
<td>Mobile Networking and Computing</td>
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<td>Contemporary topics in mobile networking and computing are covered. Topics vary and can include ad hoc networking, sensor networking, localization, mobile+cloud computing, multimedia, user behavior, mobile+social applications, energy-aware computing, and mobile application APIs on Android systems. This course is a project-based course and requires students to develop programs for platforms such as Android-based devices. PREREQ: CISC220 or CISC181 or similar course in C++ or Java. ELEG458/658 is a complementary class that students might find useful to take at the same time at this course.</td>
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<td>ELEG 655</td>
<td>High-Performance Computing with Commodity Hardware</td>
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<td>New commodity computing devices, e.g., GPUs, bring the originally elite high performance computing into the reach of general public. Principles of program optimization, GPU and IBM Cell architecture, along with concepts and techniques for optimizing general purpose computing on the new hardware. May be crosslisted with CPEG655.</td>
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<tr>
<td>ELEG 656</td>
<td>Electric Power II</td>
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<td>This is the second course in electric power systems which covers the construction materials and design principals of indoor and underground three phase low and high voltage electric power systems, system economics, reliability, load characteristics, load management, and metering. PREREQ: ELEG615.</td>
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<td>ELEG 657</td>
<td>Search and Data Mining</td>
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<td>With the increasing amount of textual information, it is important to develop effective search engines, such as Google, to help users manage and exploit the information. Examine the underlying technologies of search engines and get hands-on project experience. Requires good programming skills. Crosslisted with CPEG657.</td>
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<td>ELEG 658</td>
<td>Advanced Mobile Services</td>
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<td>Foundations for the creation of successful advanced mobile services, including the interplay of business and technology evolution, methodologies, architectures and paradigm shifts that accompany the development of converged user centric intelligent telecommunication services from location sensitive and navigation services, to social networking and remote sensing.</td>
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<td>ELEG 660</td>
<td>High Technology Entrepreneurship</td>
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<td>Focuses on the critical financial, legal, scientific and engineering issues that must be confronted during the initial planning stages of a start-up enterprise. Students work in teams to develop a business plan for a real world/business product offering.</td>
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<td>ELEG 661</td>
<td>Materials and Devices Seminar</td>
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<td>Lectures and discussions by guest speakers, faculty and students on specialized topics in materials and devices.</td>
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<tr>
<td>ELEG 662</td>
<td>Digital Systems Seminar</td>
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<td>Lectures and discussions by guest speakers, faculty and students on specialized topics in digital systems.</td>
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<tr>
<td>ELEG 663</td>
<td>Signal Processing &amp; Communications Seminar</td>
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<td>Lectures and discussions by guest speakers, faculty and students on specialized topics in signal processing and communications.</td>
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<tr>
<td>ELEG 664</td>
<td>Biomedical Engineering Seminar</td>
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<td>Lectures and discussions by guest speakers, faculty, and students on specialized topics in biomedical engineering.</td>
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<td>ELEG 665</td>
<td>Introduction to Cybersecurity</td>
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<td>Introduction to computer and network security and covers the foundation security policies and methods to provide confidentiality, integrity, and availability, as well as cryptography, auditing, and user security. Topics are reinforced with hands-on exercises run in a virtual machine environment. Crosslisted with CPEG665.</td>
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<td>ELEG 666</td>
<td>Detection and Estimation</td>
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<td>This course covers the fundamentals of detection and estimation theory for statistical signal processing. Topics include hypothesis testing theory, signal detection theory for both deterministic and random signals, signal estimation theory with various optimal estimators for both deterministic and random parameters, and their properties and performance analysis. PREREQ: ELEG305, ELEG306, ELEG310 or equivalent courses. RESTRICTIONS: Knowledge of material covered in ELEG305, ELEG306, ELEG310 or equivalent courses.</td>
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<tr>
<td>ELEG 671</td>
<td>Mathematical Physiology</td>
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<td>Mathematical methods in Human Physiology, covering cellular, tissue, organ, and integrated systems. Dynamic modeling of homeostasis, endocrine regulatory systems, immune response dynamics, mutation and selection. Mathematical methods covered include linear and nonlinear differential equations, Lapunov analysis, mass action, Hamming spaces, reaction-diffusion equations, and simulation. Crosslisted with BMEG671. RESTRICTIONS: Seniors, graduate students only.</td>
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<td>ELEG 675</td>
<td>Image Processing with Biomedical Applications</td>
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<td>Fundamentals of digital image processing, including image formation, acquisition, transforms, enhancement, restoration, coding, and reconstruction from projections. Attention given to biomedical imaging modalities, including X-ray, computed tomography (CT), magnetic resonance (MR) imaging, and ultrasound. PREREQ: ELEG305 or equivalent</td>
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<td>ELEG 677</td>
<td>Biosignal Processing</td>
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<td>Biomedical signal characteristics, biomedical systems and models, applications of Fourier transform, wavelet transforms, and joint-time frequency analysis of biomedical signals. Systems studies include ultrasounds, EKG’s, CAT scans, MRI’s, X-rays, and others. PREREQ: ELEG305, ELEG310, or equivalent</td>
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</table>
ELEG 678 INTRODUCTION TO NANO AND BIOPHOTONICS  3
Multidisciplinary approach covers fundamentals of light-matter interactions and nano-sized materials and discusses their use in understanding, characterizing and manipulating biological systems. Covers several applications including lasers, manipulation and dissociation, bio-imaging, flow cytometry and biosensors, optical biopsy and spectroscopy and photodynamic therapy.

ELEG 679 INTRODUCTION TO MEDICAL IMAGING SYSTEMS  3
Physics, instrumentation, system design, and image reconstruction algorithms will be covered for the following modalities: radiography, x-ray computed tomography (CT), single photon emission computed tomography (SPECT), positron emission tomography (PET), magnetic resonance imaging (MRI), and real-time ultrasound. Crosslisted with BMGE679. PREREQ: Requires permission of instructor.

ELEG 680 IMMUNOLOGY FOR ENGINEERS  3
Human adaptive immune response to viruses, both cellular and humoral. Generation of the immune response cells and response to types of immunogen as well as basic immunological principles. Basic mathematical models of their interactions and implications of these models for the treatment of disease. Access significant amount of current literature. No prior knowledge of biology required.

ELEG 681 REMOTE SENSING OF ENVIRONMENT  3
Detection and mapping of land and ocean resources with optical, infrared and microwave sensors. Digital analysis of satellite images using multispectral and spatial analysis techniques and correlation with ground/ship data. Application to oceanography, coastal processes, geology, land use, geography, agriculture, climate, and pollution studies. Includes hands-on image analysis in GIS laboratory. Crosslisted with MAST681. RESTRICTIONS: Requires permission of instructor.

ELEG 682 OPTICS AND PHOTONICS  3
Principles of classical optics and their applications. Topics include wave optics, material dispersion, geometrical optics, ray tracing, ABCD matrices, birefringence and Jones' formalism, Gaussian optics, coherence, interference, diffraction, pulse propagation and non-linear optics. Specific applications including optical components and instrumentation, imaging techniques, resonators and Fourier optics. Apply fundamental principles of optics and interaction between light and matter (photons).

ELEG 684 ELECTRIC VEHICLES AND THE GRID  3
This seminar covers design of electric vehicles and charging infrastructure, existing and needed policies, consumer perspective on electric vehicles, and the use of electric vehicles for grid services, including leveling variable generation. Crosslisted with MAST684. PREREQ: Enough physics or engineering to understand relationships among voltage, current, resistance and power.

ELEG 692 RADAR SYSTEMS AND TECHNOLOGY  3
Introduction of basic RADAR concepts and operational scenarios. The RADAR range is developed as are concepts related to RADAR cross-section, waveform design, antennas, transmitter and receivers. PREREQ: ELEG 320, ELEG 305.

ELEG 693 ELECTRIC MOTORS AND GENERATORS  3
This is a basic course in motor and generator performance and application. Students will learn about electric power and energy, mechanical power and energy, and the torque, speed, efficiency, and economics of the various motor and generator designs.

ELEG 694 SYSTEM HARDENING AND PROTECTION  3
Practical treatment of the defensive techniques used to harden computer systems to make them less vulnerable to cyber-attacks. Defect management, configuration/hardening, account control, logs/auditing, and risk assessment are covered and reinforced with hands-on exercises run in a virtual machine environment. Crosslisted with CPEG694.

ELEG 695 DIGITAL FORENSICS  3
Introduction to digital forensics as used to analyze criminal evidence in computer systems and digital media. Forensic tools and techniques for storage and memory analysis of windows/linux, network traffic, documentation are covered and reinforced with hands-on exercises run in a virtual machine environment. Crosslisted with CPEG695.

ELEG 696 TOPICS IN CYBERSECURITY  3
Examine varied topics in cybersecurity to coincide with the interests of students and current faculty. Potential topics include: (1) applications, web or cloud security, (2) risk management and incident response, (3) malware and reverse engineering, or (4) wireless, smartphone, or SCADA security. Crosslisted with CPEG696.

ELEG 697 COMPUTATIONAL SYSTEM BIOLOGY  3
Computational/mathematical techniques for modeling & analysis of biological systems. Includes properties of gene-regulatory and signaling networks; network reconstruction from data; stochastic modeling to study cellular variation & physiological modeling. Crosslisted with BINF695.

ELEG 698 ADVANCED TOPICS IN BIOMEDICAL ENGINEERING  3
Advanced topics in biomedical engineering. Applications of engineering techniques in biology and medicine drawn from current research literature. Assignments will include presentation of journal articles and programming assignments which illustrate ideas from the literature. PREREQ: ELEG671 or permission of instructor. RESTRICTIONS: May be repeated two times for credit.

ELEG 806 SYSTEMS BIOLOGY OF CELLS IN ENGINEERED ENVIRONMENTS  3
Provides a technical review of systems biology approaches including genomics, transcriptomics, proteomics, metabolomics, and bioinformatics as well as application in tissue engineering, machine physiology, and imaging. Intended for PhD students in interdisciplinary life science and engineering programs. Crosslisted with BINF816.

ELEG 809 ELECTROMAGNETIC THEORY I  3
Electrostatics, boundary value problems, Green functions, orthogonal functions, multipole expansion, dielectric media, magnetostatics, Maxwell’s equations, electromagnetic waves in vacuum and in dispersive media (plasmas, dielectrics, and conductors), MHD waves, electromagnetic radiation. Crosslisted with PHYS809.

ELEG 811 CHANNEL CODING THEORY AND PRACTICE  3
Standard and modern developments in channel coding. Reviews information theory topics, then introduces convolutional codes and trellis-coded modulation, iterative decoding, including turbo codes and low-density parity check codes.

ELEG 812 WIRELESS DIGITAL COMMUNICATIONS  3
Fundamentals and current techniques in wireless digital communications, including modulation, design, fading countermeasures, and multiple access techniques, such as FDMA, TDMA, and CDMA. PREREQ: Probability and linear systems.

ELEG 813 QUANTUM STATISTICAL MECHANICS  3
Basic concepts of quantum statistical mechanics, density matrix, and quantum partition function. Ideal Bose and Fermi gases; Bose-Einstein condensation. Mean field and Landau theories of phase transitions; critical phenomena; introduction to renormalization group methods. Linear response theory and Boltzman equation. Interacting quantum many-particle systems. Crosslisted with PHYS813. PREREQ: PHYS516

ELEG 815 ANALYTICS I: STATISTICAL LEARNING  3

ELEG 817 LARGE SCALE MACHINE LEARNING  3
Introduction to the analysis and processing of massive high-dimensional data. Massive data sets generally involve growth not only in the number of individuals represented but also in the number of descriptive parameters of the individuals, leading to exponential growth in the number of hypothesis considered. New approaches to address these problems exploit sparsity prior concepts from optimization theory, signal processing, statistics, and machine learning. May be crosslisted with FSAN817. PREREQ: ELEG815.

ELEG 819 TOPICS IN NETWORKING I  3
Examines standard routing protocols for wired networks such as OSPF and BGP, protocols for wireless mesh and ad hoc networks. Includes theoretical analysis of protocols and examination of data collected from networks. Topics such as load balancing, multicasting, and cross-layer interactions are covered. May be crosslisted with CPEG819. PREREQ: CPEG419, CISC450, CISC650, or ELEG651 or equivalent. RESTRICTIONS: May be repeated two times for credit.
ELEG 832 WAVELETS AND FILTER BANKS 3
Systematically studies wavelets, wavelet transforms, multi rate filter bank theory and their applications in digital communications and signal and image processing. Applications considered include wavelet denoising and wavelet subband image/video compression.
PREREQ: ELEG631 and linear algebra

ELEG 833 NONLINEAR SIGNAL PROCESSING 3
Fundamental theory and applications of nonlinear signal processing. Topics include stable random processes, order statistics, fractional lower order statistics, maximum likelihood estimation and the filtering problem, weighted order‐statistic filters, medianization of linear FIR filters, myriad filters and adaptive optimization of nonlinear filters. Applications of nonlinear signal processing include digital imaging and video, digital communications and time‐frequency analysis.
PREREQ: Statistical digital signal processing

ELEG 834 ADV. TOPICS IN SIGNAL PROCESSING 3
Course focuses on emerging areas of signal processing and communications, or in more established but specialized areas, such as array signal processing, compressed sensing, computational imaging, MIMO communications.
RESTRICTIONS: May be repeated two times for credit.

ELEG 841 ADVANCED COMPUTATIONAL ELECTROMAGNETICS II 3
Introduces the major modern computational methods for the analysis of frequency domain electromagnetic problems. The finite element method and the method of moments are covered. Students will apply these techniques to radiation and scattering problems involving metal and dielectrics.
PREREQ: ELEG648

ELEG 842 RADIO FREQUENCY AND MICROWAVE TECHNOLOGY 3
Modern telecommunications and datacom systems operate at frequencies in the radio frequency (RF) and microwave range. The basic concepts and technologies required to design RF and microwave devices and circuits are explained. Examples of applications to wireless and lightweight systems are discussed.
RESTRICTIONS: Undergraduates require permission from the instructor.

ELEG 843 FOURIER OPTICS 3
Provides an understanding of the basic principles underlying the field of optical information processing. Emphasis are on coherent optical image processing based on Fourier optics, holography, and acousto‐optics.
PREREQ: ELEG640 and ELEG648 or permission of instructor

ELEG 846 MICROWAVE AND RF PHOTONICS 3
This class discusses RF photonic components, transmission systems, and signal generation/processing/detection techniques. In depth description of the fundamental physics of operation as well as the underlying limitations will be presented. Topics including RF efficiency, nonlinear distortion, noise figure, spurious free dynamic range, phase locked loops, electro‐absorption, non‐linear materials, electro‐optic polymers, lithium niobate modulators, slot‐waveguide structures and their design, and RF integration techniques.
PREREQ: ELEG 648, or equivalent ELEG 682, or equivalent.

ELEG 852 ADVANCED TOPICS IN COMPUTING SYSTEMS 3
Focuses on the challenges and opportunities in parallel computing systems and on the design and implementation of future high‐end computer systems from multiple peta‐scale up to exa‐scale computers. Challenges are centered on the definition and specification of parallel program execution models that are sound, scalable and programmable for the intended applications. RESTRICTIONS: May be repeated two times for credit.
CROSSLISTED: CPEG682.

ELEG 853 INTEGRATED OPTICS 3
Explains 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, photonic crystals and optical detectors. Includes applications of optical integrated circuits. Emphasis on physical explanations of how devices and systems work rather than on elaborate mathematical models.

ELEG 855 MICROWAVE AND MILLIMETER‐WAVE TECHNOLOGY 3
Principles of device operation and circuit characteristics for microwave/millimeter‐wave FET, IMPATT, TRAPPATT, Gunn diode, varactor diode, p‐n diode, tunnel diode. Sub‐millimeter‐wave and terahertz‐frequency devices also described. Covers both waveguide circuits and microwave integrated circuits. Emphasis on physical explanations of how devices and systems work rather than on elaborate mathematical models.

ELEG 860 EPITAXIAL GROWTH AND BAND ENGINEERING 3
Fundamentals and recent developments in the growth of epitaxial films of electronic/optical materials and devices. Topics include vacuum technology, growth thermodynamics, heterojunction physics, materials characterization, and practical considerations. Focus on molecular beam epitaxy, but discuss complementary techniques. Crosslisted with MSEG660.

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

ENERGY AND ENVIRONMENTAL POLICY

ENEP 117 SCIENCE, SOCIETY AND ENERGY 1
Basic science and societal issues related to energy production process and effects of their uses. Topics include ethics of energy production and uses, scientific principals that govern production and use of energy, environmental issues related to the use of energy, e.g., global warming, acid rain.

ENEP 166 INDEPENDENT STUDY 1-3
Independent Study.

ENEP 250 INTRODUCTION TO ENERGY POLICY 3
Introduces field of energy policy and provides a review of the role of social, economic, political, and environmental factors in shaping the energy sector. Surveys policy, technical and economic assessments of key energy options needed to achieve a more sustainable world and the appropriate policy mechanisms to implement these options.

ENEP 266 INDEPENDENT STUDY 1-3
Independent Study.

ENEP 364 RESEARCH INTERNSHIP 3
Offers integration of educational study and practical experience in the work place in a planned and supervised learning setting. The main emphasis is the student’s development of a research paper that will contribute to an advanced understanding of the topic area in which the student intends to write his or her Senior Thesis. Field work requires 150‐200 hours in an organization in the field of energy and environmental policy.
RESTRICTIONS: Open to energy and environmental policy majors.

ENEP 366 INDEPENDENT STUDY 1-3
Independent Study.

ENEP 402 ELECTRICITY POLICY AND PLANNING 3
Analyzes technological and regulatory policy evolution of electricity industry. Considers how technology innovations and policy regulatory actions have guided industry planning from its early days.

ENEP 410 ENVIRONMENTAL SUSTAINABILITY: ECONOMIC AND POLICY ANALYSIS 3
Reviews major theories developed over last half century to explain nature and society relationships. Policy case studies of environmental justice, trade and environment, global climate change, and sustainable development are used to evaluate current range of political‐economic explanations of nature‐society relationships. International, national and local responses to these problems analyzed.
ENEP 413 WILDLIFE POLICY AND ADMINISTRATION 3
This course is an introduction to policy issues that relate to wildlife management and natural resources. Students will gain an understanding of current laws, federal agencies, policy formulation, and debate the policies of current hot topics. Crosslisted with ENWC413. PREREQ: ENWC201. RESTRICTIONS: Open to juniors and seniors only.

ENEP 420 WATER RESOURCES MANAGEMENT 3
Introduces and analyzes various aspects of water resources management and bioresources management. Topics include rainfall, runoff, water supply, groundwater, reservoirs, wastewater treatment and reuse, water quality, agricultural water management, drought management, water conservation, agricultural production systems for food and energy and the impacts of climate change on water resources and agriculture. PREREQ: MATH114 or higher.

ENEP 425 ENERGY POLICY AND ADMINISTRATION 3
Analyzes energy use and energy policy with respect to politics, society, economics, political economy, technology, resources, and environment. Focuses on interrelationships among energy, environment, economy and equity (E4). It considers the energy policy options needed to achieve a more sustainable world. May be crosslisted with UAPP425.

ENEP 426 CLIMATE CHANGE POLICY 3
Examines existing policy responses to climate change to achieve meaningful CO2 reductions. Specific attention given to possibilities and limits of scientific knowledge and technology in formulating policies to address climate risk.

ENEP 427 SUSTAINABLE ENERGY: ECONOMICS AND POLICY ANALYSIS 3
Examines existing policy responses to climate change, alongside opportunities for a redirected political economy to achieve energy and environmental conditions with meaningful CO2 reductions. Specific attention given to possibilities and limits of scientific knowledge and technology in galvanizing social change. PREREQ: ENEP425.

ENEP 466 SPECIAL PROBLEM 3-6
Independent Study.

ENEP 468 RESEARCH IN ENERGY AND ENVIRONMENT 3-6
Examines advanced research concepts, methods and findings in the fields of energy and environment. Explores topics in support of student research with a focus on sustainability issues in Northern and Southern countries.

ENEP 470 READINGS IN ENERGY AND ENVIRONMENT 3
Explores a range of concepts, issues and phenomena associated with energy and environmental policy. Allows student and instructor to interact dynamically in crafting a readings list building upon the student's interest in given topics. Successful completion of course should allow student to prepare a research paper summarizing key material and analyzing its substantive relevance to thematic concerns in the student's plan of study.

ENEP 472 SENIOR THESIS 2-6
Advanced senior research in the the areas of energy and environmental policy under the direction and subject to approval of a program faculty advisor. Requires original research and application of energy and environmental theory and policy analysis on an energy and environmental problem. RESTRICTIONS: Open to Senior Majors only. Seniors must complete 6 credits for Graduation.

ENEP 613 WILDLIFE POLICY AND ADMINISTRATION 3
Introduction to policy issues that relate to wildlife management and natural resources. Students will gain an understanding of current laws, federal agencies, policy formulation, and debate the policies of current hot topics. Crosslisted with ENWC613. RESTRICTIONS: Open to graduate students only or by permission of instructor.

ENEP 617 CONTEMPORARY ISSUES IN ENVIRONMENTAL AND ENERGY POLICY 1
Links students with leading energy and environmental policy scholars on a bi-weekly basis to debate key issues such as global warming, ozone layer deterioration, environmental justice, sustainable development and ecological democracy. International, national and community dimensions of these and other policy issues are explored through seminar discussion. May be crosslisted with UAPP617.

ENEP 624 WATER RESOURCE MANAGEMENT 3
Introduces and analyses various aspects of water resources management and bioresources management. Topics include rainfall, runoff, water supply, groundwater, reservoirs, wastewater treatment and reuse water quality agricultural water management, drought management, water conservation, agricultural production systems for food and energy and the impacts of climate change on water resources and agriculture. RESTRICTIONS: Open to graduate students and seniors.

ENEP 625 ENERGY POLICY AND ADMINISTRATION 3
Analyzes energy use and energy policy with respect to politics, society, economics, political economy, technology, resources, and environment. Focuses on interrelationships among energy, environment, economy and equity (E4). It considers the energy policy options needed to achieve a more sustainable world. May be crosslisted with MAST620, UAPP625.

ENEP 626 CLIMATE CHANGE/SCIENCE, POLICIES & POLITICAL ECONOMY 3
Examines existing policy responses to climate change, alongside opportunities for a redirected political economy to achieve energy and environmental conditions with meaningful CO2 reductions. Specific attention given to possibilities and limits of scientific knowledge and technology in galvanizing social change.

ENEP 660 ENG. ECON ANALYSIS FOR SUST. ENERGY 3
Explores the economic evaluation approaches, metrics, and level of detail required for making sound economic decisions in sustainable energy project development.

ENEP 661 SUSTAINABLE ENERGY FINANCING 3
Analyzes the practical and cutting edge innovations in financing of sustainable energy projects and enterprises. Topics include sources and instruments of sustainable energy financing, identification and management of investment risks, and financial modeling. Explore key financial policies in federal and local governments and private sector roles in catalyzing transitions to a sustainable energy regime.

ENEP 666 SPECIAL PROBLEM 1-12

ENEP 802 ELECTRICITY POLICY AND PLANNING 3
Analyzes the technological and regulatory policy evolution of the electricity industry. Considers how technology innovations and policy/regulatory actions have guided the planning of the industry from its early days. May be crosslisted with UAPP802.

ENEP 810 POLITICAL ECONOMY OF THE ENVIRONMENT 3
Reviews major theories developed over the last half century to explain nature-society relations. Policy case studies on environmental justice, trade and environment, global climate change, and sustainable development used to evaluate current range of political-economic explanations of nature-society relations. International, national and local responses to these problems are analyzed. May be crosslisted with MAST814, POSC814, UAPP810.

ENEP 820 INTERNATIONAL PERSPECTIVES ON ENERGY AND ENVIRONMENT 3
Policy analysis and political economy at international energy and environmental issues and problems. Encompasses international and multi-national government and private sector organizations, as well as non-governmental, non-profit organizations. May be crosslisted with UAPP820.

ENEP 821 PROSEMINAR: TECHNOLOGY, ENVIRONMENT AND SOCIETY 3
Over the last two centuries, forces of industrialization and urbanization have transformed economic, social and political life and the natural environment. Examines theories that explain and assess these transformations, with the goal of fostering critical analysis of social and environmental transformation in international, national and local contexts. May be crosslisted with UAPP821.

ENEP 824 SUSTAINABLE ENERGY POLICY AND PLANNING 3
Analyzes sustainable energy strategies in terms of their technology, economics, impacts on the environment and governance attributes. Also analyzes policy options to facilitate a sustainable energy future. May be crosslisted with UAPP824. RESTRICTIONS: Graduate students with a background in policy, economics and/or technology. Senior-level undergraduate students only with permission of the instructor.

ENEP 862 TEACHING PRACTICUM 1-3
In consultation with ENEP Faculty members and based on the student's long-term goals and professional background, the student participates in the development (or revision) and teaching of a course. This activity exposes PhD students who anticipate teaching careers to the pedagogical issues involved, and introduces them to the planning and implementation of course instruction. RESTRICTIONS: Requires permission of academic advisor and faculty member sponsoring practicum. One semester of Ph.D. graduate study.
ENGL 011 ENGLISH ESSENTIALS 3 RP
Required of students whose admissions credentials indicate a need for additional training in the fundamentals of composition prior to enrollment in ENGL110. Individual (tutorial) conferences and small-group instruction.

ENGL 101 TOOLS OF TEXTUAL ANALYSIS 3
Gateway introduction to basic tools and strategies used in critical engagement with poetry, fiction, drama, and nonfiction. Includes fundamental concepts of textual analysis.
REstrictions: Offered in two formats, one coupled with a section of ENGL110 and another that is writing intensive with an enrollment cap of 12 students.

ENGL 102 TEXTS IN TIME 3
How texts are shaped by social, political, scientific, technological, artistic, religious, and economic concerns of a given period and how texts, in turn, shape these concerns. Topics vary according to expertise of instructor.
PREREQ: ENGL101, 110.

ENGL 110 SEMINAR IN COMPOSITION 3
Introduction to the process of academic writing that centers on the composition of analytical, research-based essays.
Restrictions: Required of all students. Should be taken first year on campus.

ENGL 150 SCIENCE FICTION AND FANTASY 3
Study of the representative works of the genres of Science Fiction and Fantasy; variable content (e.g., historical surveys, thematic emphasis, concentration on specific period).

ENGL 166 SPECIAL PROBLEM 1-3
Study of popular fiction (literary, cinematic, and/or multi-media); may focus on period, theme, single author, etc.

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 crosslisted with ARTH202, JWST202. PREREQ: ENGL110.

ENGL 204 AMERICAN LITERATURE 3
Study of representative American works from eighteenth century to present, set in their historical and cultural contexts, introducing appropriate critical concepts.
PREREQ: ENGL110.

ENGL 205 BRITISH LITERATURE TO 1660 3
Study of representative Medieval and Renaissance British works, set in their historical and cultural contexts, introducing appropriate critical concepts.
PREREQ: ENGL110.

ENGL 206 BRITISH LITERATURE 1660 TO PRESENT 3
Study of representative British works from eighteenth century to the present, set in their historical and cultural contexts and introducing appropriate critical concepts.
PREREQ: ENGL110.

ENGL 207 INTRODUCTION TO POETRY 3
Representative masterworks of English, American and world verse.
PREREQ: ENGL110

ENGL 208 INTRODUCTION TO DRAMA 3
Representative masterworks from the classical era to the present.
May be crosslisted with CMLT218. PREREQ: ENGL110

ENGL 209 INTRODUCTION TO THE NOVEL 3
Representative masterworks of fiction, emphasizing those of Europe and America.
May be crosslisted with CMLT219. PREREQ: ENGL110

ENGL 210 INTRODUCTION TO SHORT STORY 3
Study of short story as a narrative form, with readings from American and foreign short story traditions.
PREREQ: ENGL110.

ENGL 211 GREAT WRITERS OF THE WESTERN WORLD I: 1100-1700 3
Studies writers such as Dante, Chaucer, Rabelais and Cervantes, in translation. Crosslisted with CMLT207. PREREQ: ENGL110

ENGL 212 GREAT WRITERS OF THE WESTERN WORLD II: 1650-1950 3
Studies writers such as Moliere, Voltaire, Goethe, Dostoevski, Thomas Mann and Herman Hesse, in translation. Crosslisted with CMLT208. PREREQ: ENGL110

ENGL 214 LITERATURE AND GENDER 3
Specific concepts of gender in society, as manifested in the literature of writers of both sexes.
PREREQ: ENGL110.

ENGL 215 INTRODUCTION TO ETHNIC AND CULTURAL STUDIES 3
Representations of ethnicity, social class, race, gender, and other constructions of identity in primary texts (literature, film, visual arts etc.). Secondary texts expose students to a variety of methodologies for studying culture and identity to deconstruct the processes by which scholarship is produced. Students entering the Ethnic & Cultural Studies curriculum are encouraged to think about how scholarly work is engaged in identifying research questions, laying the foundation for senior theses and collaborative research projects.

ENGL 216 AFRICAN AMERICAN LITERATURE SURVEY 3
Literature by African American Writers from the eighteenth through twenty-first centuries.
PREREQ: ENGL110.

ENGL 217 INTRODUCTION TO FILM 3
Focuses on different techniques of acting, mise-en-scene, cinematography, editing, sound and color to assess how films encourage audiences to respond in the ways they do.
May be crosslisted with CMLT217. PREREQ: ENGL110

ENGL 222 INTRODUCTION TO PROFESSIONAL WRITING 3
Designed specifically for English majors who want to explore professional writing careers, this course introduces the rhetorical theory, genre studies, and practical writing skills that form the basis of numerous professional writing and editing disciplines.
PREREQ: ENGL110.

ENGL 225 INTRODUCTION: RHETORIC AND WRITING STUDIES 3
For students interested in pursuing writing as a subject of intellectual inquiry in which to understand the roles writing plays in their lives, from work, to school, to civic engagement. Students will understand writing as a complex, cultural, historical, and rhetorical activity.
PREREQ: ENGL110.
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**Description**

- **ENGL 227 Introduction to Creative Writing**: This multi-genre creative writing course studies the craft, the formal building blocks, of effective writing. Creating both a strong foundation of terms and techniques, students will read and write in various creative genres. Students will cultivate writing habits and understand writing strategies in order to be both better readers and better writers. PREREQ: ENGL110.
- **ENGL 230 Introduction to Environmental Literature**: Survey of literature engaging the relationship between people and the natural world. Texts will be drawn from a variety of genres, and from both American and global cultures. The course serves as one of three required core courses for a minor in Environmental Humanities.
- **ENGL 231 Studies in Environmental Literature**: Study of selected topics in environmental literature with an emphasis on in-depth study beyond the genre survey course. May be repeated twice when topics vary.
- **ENGL 280 Approaches to Literature for Non-Majors**: Dual emphasis on reading and writing. Offers an introduction to poetry, fiction, and drama, and provides extensive practice in writing about literary subjects. PREREQ: ENGL110.
- **ENGL 284 Shakespeare for Non-Majors**: Representative histories, comedies, and tragedies. PREREQ: ENGL110.
- **ENGL 289 Studies in Literature for Non-Majors**: Allows for exploration of a particular aspect of the intersection of literature and culture, and enables in-depth study beyond the period survey course. Topics vary according to the expertise of the instructor. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.
- **ENGL 294 English Language: Grammar and Usage**: Descriptive study of patterns and structures of language use, with an emphasis on standard written and spoken English; attention to punctuation, mechanics, and style. PREREQ: ENGL110. RESTRICTIONS: Intended for prospective English teachers.
- **ENGL 300 Introduction to Literary Criticism and Theory**: Introduces students to a broad range of key concepts, movements, and figures associated with literary theory and criticism. PREREQ: ENGL110.
- **ENGL 306 Topics in Writing**: Special topics in writing (for example, autobiography). Variable content. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.
- **ENGL 307 News Writing and Editing**: 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.
- **ENGL 308 Reporter’s Practicum**: Builds on ENGL307 with extensive reporting and writing for the campus newspaper. Attention to libel and privacy issues. PREREQ: ENGL307.
- **ENGL 309 Feature and Magazine Writing**: All aspects of the newspaper and feature article. Developing ideas, researching, interviewing, writing, and marketing. PREREQ: ENGL307 or permission of instructor.
- **ENGL 310 Copy Editing and Layout**: Newspaper copy editing, headline writing and layout, with emphasis on practical experience. Explores improvement or updating of news stories by rewriting. PREREQ: ENGL307.
- **ENGL 311 Written Communications in Business**: 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.
- **ENGL 316 Peer Tutoring/Advanced Composition**: Trains a selected group of upper-division students in writing techniques by applying recent composition theories to students’ own writing. Explores and evaluates fundamental theories of teaching writing. Crosslisted with ARSC316.
- **ENGL 317 Film History**: History of American or various foreign national cinemas. May be crosslisted with CMLT317. PREREQ: ENGL110 RESTRICTIONS: May be repeated for credit when topics vary.
- **ENGL 318 Studies in Film**: Special topics such as film genres, major directors and Soviet cinema. May be crosslisted with CMLT318, JWST318, WOMS318. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.
- **ENGL 321 Medieval Literature and Culture**: Study of selected topics in medieval literature (romance, Chaucer’s contemporaries, drama). Texts usually read in English translations. Emphasis on medieval culture as a European phenomenon. Variable content. May be crosslisted with CMLT321. PREREQ: ENGL110.
- **ENGL 322 Chaucer**: The Canterbury Tales (in part), Troilus and Criseyde, and some of the shorter poems. PREREQ: ENGL110.
- **ENGL 323 Studies in Medieval Literature**: Allows for exploration of a particular aspect of medieval literature and culture, and enables a depth of study beyond the period survey course. Topics vary according to expertise of instructor. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.
- **ENGL 324 Shakespeare**: Representative histories, comedies and tragedies. PREREQ: ENGL110.
- **ENGL 325 Renaissance Literature**: Survey of varied literary written in England during the sixteenth and seventeenth centuries, from the age of the Reformation through the English Civil Wars. For example, selected works of Wyatt, Sidney, Spenser, Marlowe, Shakespeare, Jonson, Webster, Herbert, Vaughan, Marvell and Milton. PREREQ: ENGL110.
- **ENGL 326 Studies in Renaissance Literature**: Allows for exploration of a particular aspect of Renaissance literature and culture, and enables a depth of study beyond the period survey course. Topics vary according to expertise of instructor. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.
ENGL 328  MILTOn  3  Milton's major poetry and selected prose.  PREREQ: ENGL110.

ENGL 330  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. Crosslisted with CRJU336.

ENGL 331  THE AGE OF SATIRE  3  Dryden, Pope, Swift and their contemporaries.  PREREQ: ENGL110.

ENGL 332  STUDIES IN RESTORATION AND EIGHTEENTH CENTURY LITERATURE  3  Studies of selected topics in Restoration and eighteenth century literature and culture, e.g., the epistolary novel, Restoration and eighteenth century drama and women in eighteenth century literature. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 333  BRITISH ROMANTICISM  3  Poetry and prose of the British Romantic writers.  PREREQ: ENGL110.

ENGL 338  STUDIES IN VICTORIAN LITERATURE  3  Studies of significant British texts from the nineteenth century, the social forces they shaped, and those by which they were shaped. Content varies by expertise of instructor. May be crosslisted with WOMS337. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 340  AMERICAN LITERATURE TO THE CIVIL WAR  3  PREREQ: ENGL110

ENGL 341  AMERICAN LITERATURE: CIVIL WAR TO WORLD WAR II  3  PREREQ: ENGL110

ENGL 342  AMERICAN LITERATURE SINCE WORLD WAR II  3  PREREQ: ENGL110

ENGL 344  AFRICAN AMERICAN LITERATURE I  3  Literature by African American writers from the eighteenth century to the Harlem Renaissance. May be crosslisted with BAMS313. PREREQ: ENGL110

ENGL 345  AFRICAN AMERICAN LITERATURE II  3  Literature by African American writers from the Harlem Renaissance to the present. May be crosslisted with BAMS345. PREREQ: ENGL110

ENGL 347  STUDIES IN AMERICAN LITERATURE  3  Special topics, ranging from the beginnings to contemporary American literature; may include studies in a single author or authors (e.g., the detective stories of Poe) or period and genre studies (e.g., the Harlem Renaissance or the humor of the old southwest). Variable content. May be crosslisted with BAMS347. RESTRICTIONS: May be taken up to three times 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 crosslisted with JWST348. PREREQ: ENGL110

ENGL 349  INTRODUCTION TO JEWISH SOURCES: TEXT AND INTERPRETATION  3  Examines the central texts which form the basis of Jewish thought, religion and culture—the Torah, or Hebrew Bible (in translation) and the interpretive traditions which have evolved to understand it (e.g., Midrash, Rashi, contemporary theology) as sources of uniquely Jewish meanings. May be crosslisted with JWST349.

ENGL 350  STUDIES IN JEWISH LITERATURE  3  Focus on Jewish writers, stories, and/or culture from around the world. Course content will address issues, concepts, or problems such as: anti-Semitism, passing, secularism, Jewish-Christian and Jewish-Muslim relations, Diaspora, homeland, nation, race, ethnicity, and/or the Holocaust. May be crosslisted with JWST350. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 351  STUDIES IN IRISH LITERATURE  3  Studies of Irish literature from the earliest times to the present day. Content varies by expertise of instructor. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 352  STUDIES IN NINETEENTH CENTURY LITERATURE  3  Special topics in an author or authors, a genre, literary movement, or an idea. May be crosslisted with WOMS352. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 353  TWENTIETH CENTURY BRITISH LITERATURE  3  Broadly focused study of literature in several genres, including a variety of eras and movements such as turn-of-the-century realism, war poetry, modernism, and post-colonial writing. May be crosslisted with WOMS353. PREREQ: ENGL110

ENGL 356  STUDIES IN MODERN/CONTEMPORARY LITERATURE  3  Study of selected topics in 20th century British, American and world literature, e.g., the contemporary epic novel, post-colonial writing and politics. May be crosslisted with BAMS356. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times 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 361  STUDIES IN 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. Content varies by expertise of instructor. May be crosslisted with CMLT361. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 365  STUDIES IN LITERARY GENRES, TYPES AND MOVEMENTS  3  Particular areas or writers to be announced. May be crosslisted with JWST365. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 366  INDEPENDENT STUDY  1-6

ENGL 368  STUDIES IN LITERATURE AND SCIENCE  3  Studies of the interrelation of literature and science. Content varies by expertise of instructor. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 369  SLAVE NARRATIVES IN THE AFRICAN DIASPORA  3  Examine the institution of slavery in the Americas through the perspective of the slaves who endured it. Letters, speeches, interviews and narratives will be examined within the historical context of 18th and 19th century slave society. The goal of the course is to 1) gain a deeper understanding of the slave experience from the slave's point of view, 2) examine the historical dimensions of slave testimony and its use as historical evidence, and 3) understand the gendered, regional, period and spatial nuances of the slave experience. Crosslisted with BAMS369.

ENGL 371  STUDIES IN FICTION  3  Special topics in the novel and short story. Topics may emphasize an author or authors, a type or types of fiction, a period or theme. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 372  STUDIES IN DRAMA  3  Special topics in an author or authors, a type or types of drama, a period or theme. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 373  STUDIES IN POETRY  3  Special topics in a poet or poets, a type or movement, a period or theme. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 376  WORLD LITERATURE  3  Introduction to and appreciation for broad range of literatures written in English. Encompasses both Western and non-Western literature, with some emphasis on post-colonial literature. PREREQ: ENGL110.

ENGL 378  CARIBBEAN LITERATURE  3  Multicultural survey of Anglophone, Francophone, and Hispanic Caribbean literature in its historical and cultural contexts. Emphasis on contemporary novels, short stories, drama, and poems. PREREQ: ENGL110.

ENGL 380  WOMEN WRITERS  3  Study of a variable set of women writers. Addresses such topics as the idea of a woman’s tradition, formation of the canon, use of genre, language and form. May be crosslisted with WOMS380. PREREQ: ENGL110.
ENGL 381  WOMEN IN LITERATURE  3
Cultural representations of women by male as well as female writers. Variable in historical range, geography, and genre.
May be crosslisted with WOM381. PREREQ: ENGL110. RESTRICTION: May be taken up to two times when topics vary.

ENGL 382  STUDIES IN MULTICULTURAL LITERATURE IN ENGLISH  3
Consideration of multiculturalism as it pertains to American culture or literature in English from Africa and other non-European societies. Variable in historical range, geography, and genre.
May be crosslisted with BAMS382, JWST382, WOM382. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 385  STUDIES IN LITERARY CRITICISM AND THEORY  3
Studies in selected topics in literary criticism and critical theory.
May be crosslisted with CMLT385. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 386  ASIAN AMERICA: CULTURE AND HISTORY  3
Explores the literature, culture and history of Asian Americans and immigrants to the United States variously using fiction, drama, poetry, documentary, photography, narrative film, drama, court cases, primary and secondary historical materials. Patterns of Asian immigration, anti-Asian violence and interment, Asian American resistance in litigation, legislation, and cultural activities, from Gold Rush to globalization.
May be crosslisted with EAST386, HIST386.

ENGL 390  ENGLISH LINGUISTICS  3
General introduction to the study of the English language, with emphasis on modern linguistic approaches.
May be crosslisted with LIN190. PREREQ: ENGL110.

ENGL 391  HONORS COLLOQUIUM  3
First year interdisciplinary Honors seminar. May be team-taught, specific topics vary.

ENGL 392  TEACHING WRITING ONE-TO-ONE  3
A writing intensive course that trains students to be peer tutors in the University Writing Center. Introduces students to theories of composition as well as principles of rhetoric that inform writing and tutoring instruction. Students selected through an interview and screening process.
PREREQ: ENGL110 RESTRICTIONS: Students selected through an interview and screening process.

ENGL 394  ENGLISH LANGUAGE: RHETORICAL AND CULTURAL CONTEXTS  3
Language variation over time and across geography, culture and dialect. Rhetorical analysis of written and spoken English, attending to style, situation and genre. Applications of grammatical knowledge to describing language use in various contexts. Intended for prospective English teachers.

ENGL 395  LITERACY AND TECHNOLOGY  3
Introduces students to the relationships between literacy practices and technology. Requires students to gain proficiency in multimodal practices and to apply their skills to solving a literacy-based problem in their intended field.
PREREQ: ENGL110.

ENGL 396  TEACHING COMPOSITION IN SECONDARY SCHOOL  3
Emphasizes contemporary theories about helping adolescents learn to write effectively in various genres. Students assist local teachers in conducting writing workshops or assessing student work.
PREREQ: ENGL110.

ENGL 397  WRITING THE NEW MEDIA  3
Writing for the various new media has created a wholly new landscape for writers. Explore rhetorical study the unique issues, problems and opportunities born out of it. Students will write for these new mediums while practicing their idiosyncratic composing qualities.
PREREQ: ENGL110.

ENGL 403  LITERATURE FOR ADOLESCENTS: MULTIMEDIA TEXTS  3
Explores classic and contemporary reading materials and non-print texts pervasive in lives of adolescents. Addresses selection of texts for middle school classes as well as techniques for developing and promoting critical reading and informed interpretation of non-print texts.
Crosslisted with EDUC403.

ENGL 404  ADVANCED POETRY WRITING  3-6
Intensive practice in composition. Group discussion and individual conferences. Wide reference to professional poems as well as models. Emphasis on student competence in traditional prosody as well as exploring freer forms.
PREREQ: ENGL304 RESTRICTIONS: May be repeated once for credit.

ENGL 405  ADVANCED FICTION WRITING  3
PREREQ: ENGL305. RESTRICTIONS: May be repeated once for credit.

ENGL 406  NON-FICTION WORKSHOP  3
Exploration of a variety of forms, including memoir, literary journalism and personal essay, through readings, exercises and substantial writing projects.
PREREQ: ENGL305, ENGL309, or permission of instructor.

ENGL 407  INVESTIGATIVE REPORTING  3
In-depth reporting, research methods, ethics, and other topics.
PREREQ: ENGL307. RESTRICTIONS: May be repeated once for credit.

ENGL 408  SPORTS WRITING  3
Training and covering all major sports including both women's and men's sports.
Topics include keeping statistics, game coverage, player profiles, and sports columns.
PREREQ: ENGL307 or permission of instructor.

ENGL 409  TOPICS IN JOURNALISM  3
Special studies and writing in selected kinds of journalism (opinion writing, science journalism) or in an aspect of the profession (history of American journalism, ethics of journalism). Variable content.
PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 410  TECHNICAL WRITING  3
Selected problems in technical communications, the preparation of reports and technical editing.
PREREQ: ENGL110.

ENGL 411  RHETORIC OF THE PROFESSIONS  3
Study of rhetorical theories and strategies within professional contexts.
PREREQ: ENGL110.

ENGL 412  PUBLISHING PROJECTS  3
Through projects and course readings, this course covers the entire publication process from writing and editing text, to designing a layout and working with visuals, to final printing. Topics include book history, aesthetic theory, information design, and visual rhetoric.

ENGL 413  TOPICS IN PROFESSIONAL WRITING  3
Studies of writing in professional settings: technical, business, legal, medical, scientific, environmental, governmental. Includes considerations of rhetoric, design, and use.
PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 414  EDITING  3
Practical work and study of the editorial procedures essential in editing professional publications, both print and online.
PREREQ: ENGL110.

ENGL 416  DESIGNING ONLINE INFORMATION  3
Focuses on the design of information displayed on websites including the theory of information design and its practical application. Lecture sessions cover such topics as user and task analysis, interface design, website navigation, information architecture, and usability. The lab sessions provide instruction on Dreamweaver and Fireworks, as well as some HTML.

ENGL 417  FILM THEORY AND CRITICISM  3
Survey of major theories of film.
PREREQ: ENGL117.

ENGL 418  WRITING IN THE SCIENCES  3
Conventions of written communication in biomedical and scientific-related fields are explored.
PREREQ: ENGL110.

ENGL 430  LEGAL WRITING  3
Focuses on the analytical skills necessary to address a wide range of legal audiences: clients, op-ponents, judges, regulatory agencies, and legislators. Emphasis on creating a streamlined prose style that is suitable for any legal writing task.
PREREQ: ENGL110.

ENGL 450  LEGAL ARGUMENT  3
Focus on legal advocacy. By analyzing court opinions, legal briefs, law-review articles, and other sources, students will learn how attorneys arrange the language in logical steps that culminate in coherent arguments. Students will apply these techniques in a variety of legal scenarios.
ENGL 462 EXPERIENTIAL LEARNING 3
Learning experience, on or off campus, under supervision of faculty member.
Instructional learning both in and out of class and beyond existing department courses. Discovery learning experiences such as research, service learning, and fieldwork.
PREREQ: ENGL 110 and six ENGL credits at the 300-level or higher or by instructor consent.
RESTRICTIONS: May be repeated twice for credit.

ENGL 464 INTERNSHIP IN PROFESSIONAL WRITING 3 PF
Students work on writing projects at local corporations, government divisions, or public agencies, under joint supervision of the Department of English and the sponsoring organization. The internship involves approximately ten hours of work a week.
PREREQ: ENGL411 and ENGL412 or permission of instructor.
RESTRICTIONS: Open to qualified students on the basis of a portfolio review by all concentration faculty.

ENGL 466 INDEPENDENT STUDY 1-9

ENGL 468 UNDERGRADUATE RESEARCH 1-3
Faculty sponsored research.

ENGL 469 INTERNSHIP 1-3
Internship experiences that have been arranged or are currently sponsored by an English Department faculty member.

ENGL 472 STUDIES IN THE DRAMA 3
Special topics in an author or authors, a type or types of drama, a period or theme.
PREREQ: ENGL101, ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

ENGL 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).
Crosslisted with LING477. PREREQ: LING101.

ENGL 479 LITERACY AND LITERATURE 1-4
Explores the concept of literacy using a variety of perspectives: scientific, historical, cultural, sociological, political, and literary. Designed for teacher education students and incorporates field work and addresses the state standards that teachers are asked to have their students meet.
RESTRICTIONS: Offered for students in the Milford ETE program.

ENGL 480 LITERARY STUDIES SEMINAR 3
Intensive capstone seminar employs research presentations as the occasion for students to consolidate skills acquired in 100-, 200-, and 300-level coursework. Content varies by expertise of instructor. May be crosslisted with JWST480, WOMS480. PREREQ: ENGL 110 and six ENGL credits at the 300 level or higher or by instructor consent. RESTRICTIONS: Can be repeated once when topics vary. Only counts toward major if taken as senior (after completing 90 credits). Non-seniors are not excluded, but a student who completes the course before senior year must re-take the course as a senior for major credit.

ENGL 481 TEACHING ENGLISH IN SECONDARY SCHOOL 3 PF
Accompanies student teaching in secondary school English. Deals with classroom management and other professional issues.
PREREQ: ENGL110 COREQ: EDUC400 RESTRICTIONS: Open only to student teachers in English.

ENGL 482 SEMINAR IN TEACHING ENGLISH I 3
Prepares English education seniors and graduate students to teach oral and written composition at the secondary school level.
COREQ: ENGL483 RESTRICTIONS: Enrollment limited to English education seniors.

ENGL 483 SEMINAR IN TEACHING ENGLISH II 3
Prepares English education seniors and graduate students to teach adolescent literature, classic literature and non-print literary expression at the secondary school level.
COREQ: ENGL482/682 RESTRICTIONS: Enrollment limited to English education seniors.

ENGL 491 METHODS IN TEACHING SECONDARY ENGLISH 3
Prepares students to design instruction that integrates all the English Language Arts, including reading, writing, speaking, listening, and viewing. Students gain instructional experience via a 45-hour practicum in their assigned student teaching classroom.
PREREQ: ENGL110. RESTRICTIONS: Enrollment limited to English Education seniors.

ENGL 492 SEMINAR IN TEACHING SECONDARY ENGLISH 3
Accompanies student teaching in secondary English. Addresses professional issues, including instructional design, assessment, classroom management, and building relationships with colleagues and students’ families.
PREREQ: ENGL110. COREQ: EDUC400. RESTRICTIONS: Enrollment limited to English Education seniors.

ENGL 494 HISTORY OF THE ENGLISH LANGUAGE 3
The development of Modern English with emphasis on changes in sounds, inflections, spelling, and vocabulary. Attention also to usage, dialects, attitudes toward language, and cultural history.
PREREQ: ENGL110

ENGL 600 INTRODUCTION TO GRADUATE STUDIES IN ENGLISH 1-3
Negotiate the modes of reading and modes of authority encountered in academic work. Introduction to the library and other resources for graduate study in English. Acquire a better understanding of the genres of our profession, especially the academic article and monograph.

ENGL 621 MEDIEVAL LITERATURE AND CULTURE 3
Survey of medieval culture and ideas as expressed in literature (e.g., Beowulf, The Canterbury Tales, The Divine Comedy) and/or in history, philosophy, etc. (e.g., Boethius, Augustine, Thomas Aquinas), and topics (e.g., orality and literacy, epic and romance, genres).

ENGL 625 EARLY MODERN LITERATURE 3-6
Survey of a wide selection of authors (e.g., More, Wyatt, Sidney, Spenser, Marlowe, Donne, Herbert, Marvell, Jonson, Webster, Middleton, the Cavalier poets, Marvell, Milton); some of Shakespeare's works may also be included.
RESTRICTIONS: May be repeated once for credit when topics vary.

ENGL 631 EIGHTEENTH CENTURY LITERATURE 3-6
Topics may include (but are not restricted to) general survey (i.e., selected poetry, drama, fiction), genre survey, gender studies (e.g., women writers), or thematic issues (e.g., literature and politics).
RESTRICTIONS: May be repeated once for credit when topics vary.

ENGL 634 STUDIES IN NINETEENTH CENTURY LITERATURE 3
Survey of Romantic and/or Victorian Literature.
RESTRICTIONS: May be repeated once for credit when topics vary.

ENGL 636 TWENTIETH CENTURY LITERATURE 3
Broadly focused to include multiple genres and/or movements (e.g., turn-of-the-century realism, war poets, modernism, postmodern drama) from before and after World War II. May include American, European and post-colonial, in addition to British literature.

ENGL 639 STUDIES IN MODERN/CONTEMPORARY LITERATURE 3
Study of selected poetry, prose, and drama of the twentieth century, with an emphasis on the major texts of English and American literature during the period. Some attention given to other literary traditions and writings.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 641 STUDIES IN AMERICAN LITERATURE 3
Study of particular themes, movements, or authors in American Literature.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 651 IRISH LITERATURE: PERIOD STUDIES 3
Study of particular themes, movements, or authors in Irish literature.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 654 STUDIES IN ANGLOPHONE WORLD LITERATURE 3
Survey of representative examples of poetry, prose, and drama from world literature written in English. May be organized around genres, national or regional traditions, or broad thematic categories.

ENGL 671 STUDIES IN FICTION 3
Special topics in the novel, short story, or non-fiction prose works.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 672 STUDIES IN DRAMA 3-9
Study of an author or authors, a type or types of drama, a period or theme.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 673 STUDIES IN POETRY 3-9
Special topics on a poet or poets, a type or movement, a period or theme.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 675 STUDIES IN FILM AND MEDIA 3
Survey of major periods, themes, or movements in film and media.
ENGL 677  THE STRUCTURE OF ENGLISH  3
Explores current generative linguistic theories and the analysis of English phonology/morphology and syntax in the light of these theories. Contrastive analysis of English and a second language (such as Spanish). Crosslisted with LING677.

ENGL 680  SEMINAR  3-12

ENGL 682  SEMINAR IN TEACHING ENGLISH I  3
Prepares English education seniors and graduate students to teach oral and written composition at the secondary school level.
COREQ: ENGL683
RESTRICTIONS: Enrollment limited to English education seniors and graduate students.

ENGL 683  SEMINAR IN TEACHING ENGLISH II  3
Prepares English education seniors and graduate students to teach adolescent literature, classic literature and non-print literary expression at the secondary school level.
COREQ: ENGL682
RESTRICTIONS: Enrollment limited to English education seniors and graduate students.

ENGL 684  LITERARY THEORY AND CRITICISM  3-6
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
Topical introduction to one or more cultural theories, providing a survey of scholarship on such varied topics as semiotics, deconstructionism, feminism, material culture, race, ethnicity studies, postcolonial and global studies, and problems of representation and signification in literary and non-textual arts. May be crosslisted with ARTH685.
RESTRICTIONS: May be repeated once for credit when topics vary.

ENGL 688  INTRODUCTION TO COMPOSITION THEORY AND THE TEACHING OF WRITING  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  SPECIAL TOPICS IN OLD & MIDDLE ENGLISH  3
A study of the English language either from before 1100 or between 1100 and 1400 with selected readings in Old or Middle English poetry and prose. May be crosslisted with LING802.
RESTRICTIONS: May be repeated once for credit when topics vary.

ENGL 804  SP TOPICS IN MEDIEVAL LITERATURE AND CULTURE  3
Intensive study of literature and language in Old English or Middle English, with attention to history and culture. Recent course titles: Chaucer, Beowulf, The Gawain-Poet, The Age of Langland, The Romance.
RESTRICTIONS: May be repeated once for credit when topics vary.

ENGL 806  SPECIAL TOPICS IN EARLY MODERN LITERATURE  3
Focuses on one or two authors (e.g., Shakespeare or Spenser), genres (e.g., narrative verse and prose, the lyric, drama) or specific periods (Elizabethan, Jacobean, the Civil War).

ENGL 820  SPECIAL TOPICS IN EIGHTEENTH CENTURY LITERATURE  3
Variable content. Possible topics include: Restoration Theatre; English Neoclassicism; The Rise of the Novel; individual writers or groups of writers; applications of theory.
RESTRICTIONS: May be repeated once when topics vary.

ENGL 830  SPECIAL TOPICS IN NINETEENTH CENTURY LITERATURE  3-9
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  SPECIAL TOPICS IN TWENTIETH CENTURY LITERATURE  3
Variable content. Concentrated study of an aspect of twentieth century British, European, American and/or post-colonial literatures. Possible focuses: a genre, a set of writers, cultural issues (e.g., gender, race, the Holocaust, aesthetics vs. politics).
RESTRICTIONS: May be repeated once when topics vary.

ENGL 844  SPECIAL TOPICS IN AMERICAN LITERATURE  3-12
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 846  SPECIAL TOPICS IN BRITISH LITERATURE  3
Concentrated study of particular genres, themes, periods, movements, or schools in British literature.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 848  SPECIAL TOPICS IN COMPARATIVE LITERATURE  3
RESTRICTIONS: May be repeated once for credit when topics vary.

ENGL 854  SPECIAL TOPICS IN ANGLOPHONE WORLD LIT  3
Study of particular themes, movements, or authors in Anglophone World literature. Topics may include, but are not limited to, transnational novel, postcolonial fiction, and poetry of the British diaspora.

ENGL 868  RESEARCH  3

ENGL 869  MASTER'S THESIS  1-6

ENGL 870  SPECIAL TOPICS IN LITERARY HISTORY  3
Concentrated study of a particular genre, period, movement, or school of literature.

ENGL 872  SPECIAL TOPICS IN RACE AND ETHNICITY  3
Variable content. Concentrated study of the ways ideas of race and ethnicity shape, and are shaped by, literature and culture. Will include discussion of theoretical and historical conceptualizations of race and ethnicity, and, when relevant, religion, diaspora, nations and nationalism, colonialism, and/or imperialism.
RESTRICTIONS: May be repeated once when topics vary.

ENGL 874  SPEC. TOPICS IN PRINT & MATERIAL CULTURE  3
Variable content. Concentrated study of the major issues in print culture, the history of the book, material culture studies, and related areas. Will include discussion of methodologies and theoretical approaches.
RESTRICTIONS: May be repeated once when topics vary.

ENGL 875  SPECIAL TOPICS IN TRANSNATIONAL STUDIES  3
Variable content. Concentrated study of Atlantic World or global flows of literature and culture. Will include discussion of methodological and theoretical issues related to the study of transnational cultural exchange.

ENGL 876  SPECIAL TOPICS IN FILM AND MEDIA  3
Variable content. Concentrated study of a particular genre, period, movement or school of film or other media.

ENGL 884  STUDIES IN LITERARY AND CULTURAL THEORY  3-9
Close examination of a single topic or a closely related group of topics (e.g., psychoanalysis and interpretation, genre theory, literary historiography, feminist critique) in textual study.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 890  STUDIES IN LINGUISTICS  3-9
Varying topics in linguistics, such as grammatical theory, grammatical analysis, syntax, historical-comparative linguistics, stylistics and grammar testing.
Crosslisted with LING890.
RESTRICTIONS: May be repeated for credit when topics vary.

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

ENGL 969  DOCTORAL DISSERTATION  1-12 PF

ENVIRONMENTAL SCIENCE

ENSC 101  INTRODUCTION TO THE ENVIRONMENT  3
Broad overview of the fields of environmental science and environmental studies. Introduction to the spectrum of science and policy that is associated with environmental work and explore specific issues, perspectives and approaches from these varied areas.
May be crosslisted with ENV101.
RESTRICTIONS: Open to Freshman ENSC or ENVR majors only.

ENSC 166  SPECIAL PROBLEM  1-3
ENSC 266  SPECIAL PROBLEM  1-3

ENSC 300  EARTH SYSTEMS: SCIENCE AND POLICY  3
Integrative framework necessary to understand the systems approach to environmental science and its intersection with environmental policy and management. Introduction to systems theory within environmental science and its relevance to environmental policy. May be crosslisted with ENV/R300. RESTRICTIONS: Environmental Science and Studies Majors only.

ENSC 366  INDEPENDENT STUDY  1-6

ENSC 425  ENVIRONMENTAL FIELD METHODS  3
Introduction to the instrumentation and measurement techniques involved in the observation and monitoring of environmental systems. Issues concerning experimental design, instrument performance, instrument calibration and data quality control are emphasized. RESTRICTIONS: Environmental science majors are given preference in enrolling.

ENSC 426  ALPINE ENVIRONMENTAL FIELD METHODS  3
Introduction to field measurement techniques and field analysis during a travel and field learning experience to an alpine area. Field mapping, observation, use of handheld instrumentation, and field estimation methods. RESTRICTIONS: Permission of instructor.

ENSC 427  APPLIED ENVIRONMENTAL SCIENCE  3
Introduction to the diverse field of environmental consulting: an application of science to the solution of environmental problems. Topics include project planning, data collection and analysis, health and safety, work products, business management, accounting and contracts, marketing, professional responsibility and ethics. RESTRICTIONS: Open to junior and seniors or by permission of instructor.

ENSC 450  PROSEMINAR IN ENVIRONMENTAL SCIENCE  3
Discussion of the history and state of environmental science as well as its relation to current environmental problems. Survey of research topics and methodologies in the current scientific literature. May be crosslisted with ENV/R450. RESTRICTIONS: Open to environmental science and studies majors only, or requires permission of instructor.

ENSC 464  ENVIRONMENTAL INTERNSHIP  3-6
Internship experience that integrates environmental science and/or studies learning goals in an experiential environment. To satisfy the Field Experience requirement, the internship MUST include data collection, analysis and interpretation and weekly reports/logs that include student reflection on the internship experience. Internship must be approved by the environmental science and studies program and includes oversight by a faculty member. May be crosslisted with ENV/R464. RESTRICTIONS: May be repeated up to six credits.

ENSC 466  INDEPENDENT STUDY  1-6

ENSC 468  HONORS: DIRECTED RESEARCH  3-6
Constitutes a directed research experience for honors students. Topics of research will be in the realm of environmental science and/or studies, depending on the interests and expertise of the student and supervising faculty member. May be crosslisted with ENV/R468. RESTRICTIONS: Honors Only.

ENSC 475  ENVIRONMENTAL STATISTICS  3
Introduction to statistical methods for analyzing environmental data. Relevant probability and sampling theory is introduced, as well as procedures for summarizing, modeling and estimating and making inferences from environmental data. A computer-based statistical package is used to explore behavior of different statistical techniques with a variety of environmental data sets. Crosslisted with STAT475. RESTRICTIONS: If STAT475 is taken, degree credit cannot be given for any of the following courses: MATH300, STAT470, STAT471 or MATH450.

ENTREPRENEURSHIP

ENTR 155  START UP OF THE PROFESSIONAL YOU  1
Focuses on the development of practical professional skills, building meaningful relationships and fostering an entrepreneurial mindset. Students will learn how to brand themselves through the use of social media; acquire communication, social influence, and networking skills; and develop an understanding of how to succeed in any workplace.

ENTR 156  FROM IDEAS TO ACTION  1
Introduction to the entrepreneurial process involved in generating ideas and moving from an idea to entrepreneurial action. Tools and practices associated with evidence-based entrepreneurship, which can be described as "building a business like a scientist," are emphasized. Focus is on conceiving, initial testing and pitching of a business idea that is of interest in pursuing.

ENTR 157  VENTURING FOR GOOD  1
Introduction to key concepts and challenges associated with utilizing entrepreneurial ventures as a sustainable and effective means for addressing important societal and environmental problems. Use of an evidence-based process and giving special attention to the needs of beneficiaries in developing revenue generating nonprofit organizations and mission-driven businesses are emphasized as best practices for turning ideas into action.

ENTR 350  INTRODUCTION TO ENTREPRENEURSHIP  3
This course focuses on understanding the basic concepts, tools, and practices of entrepreneurship and the development of entrepreneurial skills. The entrepreneurial process (opportunity recognition, resource marshaling, and team building driven by problem solving, creativity, and leadership) and business planning are emphasized. May be crosslisted with BUAD350.

ENTR 351  ENTREPRENEURIAL MARKETING  3
This course covers basic and advanced marketing topics pertinent to bringing new innovations to market, including: product concept testing and the new product development process; customer behavior as it relates to the adoption of new products; characteristics of high technology and other types of entrepreneurial markets; test marketing; market segmentation, targeting, and positioning; the formulation of go-to-market strategies (including product, distribution, promotional, and pricing strategies); and entrepreneurial selling. May be crosslisted with BUAD351.

ENTR 352  BUSINESS LAUNCH PAD  3
This course introduces students to the lean startup concept, and focuses on the development of viable business models. Such models result from customer and other marketplace interactions, so students will be required to get out of the classroom by speaking with customers and others to test hypotheses about the product, the market, channels, revenue streams, costs, and other aspects of their business models. Students will be expected to use marketplace feedback to rapidly iterate/pivot until a viable model is created. Prerequisites: ENTR/BUAD350 and ENTR/BUAD351 or instructor’s permission. May be crosslisted with BUAD352. PREREQ: ENTR/BUAD350 ENTR/BUAD351 or permission of instructor.

ENTR 353  ENTR APPRENTICE: LEADERSHIP & INFLUENCE  3
This course focuses on the development of entrepreneurial leadership and influence skills through the completion of hands-on tasks in actual business situations.

ENTR 355  USER-CENTERED RESEARCH METHODS FOR ENTREPRENEURSHIP  3
Provides foundational tools for understanding customer and societal issues on an individual and contextualized level. User-centered research methods such as observation, depth interviewing, cultural consensus analysis and projective techniques are applied to identifying problems, unmet needs and opportunities. User-centered methods are also utilized to guide idea generation and solution testing as students engage in real-world application across a variety of fields.

ENTR 356  CREATIVITY AND DESIGN THINKING  3
Introduction to creativity theory and creative problem-solving, including the highly valuable capacities of design thinking. Topics include creativity processes, problem-finding, user-experience methods, idea-generating techniques and developing a creative disposition. Students also develop design thinking skills as they engage in creative activity.

ENTR 364  ENTREPRENEURSHIP IN PRACTICE: INTERNSHIP  3
Emphasizes career development, reflection, and personal assessment. It is designed to accompany a minimum of 100 hours of employment in an entrepreneurial context. Restriction: Enrollment is limited to students who are participating in the E-Internship Program (through the Entrepreneurial Studies Program) or an internship that has been approved by the course instructor. May be crosslisted with BUAD363. PREREQ: ENTR350 and ENTR351 or Permission of Instructor. RESTRICTIONS: None.
ENTR 420 SOCIAL ENTREPRENEURSHIP 3
This course focuses on developing creative, sustainable solutions to address societal problems. The course is designed to empower students to see social entrepreneurship as a force for social change and give them the knowledge, skills and connections needed to make an impact on the lives of others.

ENTR 450 BUSINESS ACCELERATOR FOR NEW VENTURES 1-6
This course focuses on helping students who have well-developed business ideas and/or existing businesses to accelerate the startup & growth of their companies. The course will begin with the conduct of a business model audit to determine appropriate goals/milestones for each business. Students will then be tasked with developing and implementing strategies to accomplish their goals/milestones. Whenever possible, students will be connected with providers of needed services, financial resources, and mentors. Prerequisites: Students must be licensees of the Venture Center; ENTR/BUAD350, ENTR/BUAD351 or instructor’s permission. Notes: This will be a variable credit course, allowing students to earn 1-3 credits per semester up to a total of 6 credits. May be crosslisted with BUAD450. PREREQ: ENTR/BUAD 350 AND ENTR/BUAD 351 OR PERMISSION OF INSTRUCTOR.

ENTR 451 SPECIAL TOPICS IN ENTREPRENEURSHIP 3
Examines selected topics of current interest in various areas of entrepreneurship. Prerequisites: ENTR/BUAD350, ENTR/BUAD351 or instructor’s permission. May be crosslisted with BUAD451. PREREQ: ENTR/BUAD350 ENTR/BUAD351 or permission of instructor.

ENTR 455 STARTUP EXPERIENCE I 3
Students work together in interdisciplinary teams to learn and utilize a repeatable method for developing business or social business concepts. Core topics include: customer development, lean startup, types of businesses, opportunity recognition, ideation, validation of business model hypotheses, intellectual property, business strategy, team building, and venture capital.
RESTRICTIONS: This course is part II of the Horn Program in Entrepreneurship’s Startup experience. Permission from the Horn Program is required for enrollment.

ENTR 456 STARTUP EXPERIENCE II 3
Involves attempting to develop and launch a high growth potential business. Students work together in interdisciplinary teams to validate their business concepts, optimize business processes and strategies, and begin to acquire customers. Challenges associated with rapid growth are emphasized. PREREQ: ENTR455. RESTRICTIONS: This course is part II of the Horn Program in Entrepreneurship’s Startup xExperience. ENTR455 or permission from the Horn Program is required.

ENTR 457 LEGAL ISSUES FOR ENTREPRENEURS 3
Explores important legal issues faced by entrepreneurs as they put their ideas into action. Topics are sequenced to mirror the entrepreneurial process, beginning with pre-startup issues like partnership agreements and intellectual property, continuing to entity formation, governance and ownership issues, and ending with emerging growth and exit transactions. May be crosslisted with ACC7457.

ENTR 458 APP DEVELOPMENT FOR NEW TECHNOLOGY 3
Presents frameworks for developing commercially feasible applications of new technology. Students work together in teams to complete proof of concept testing that typically involves primary and secondary market research and an assessment of technological feasibility, value, and use for specific applications.
RESTRICTIONS: Permission from the Horn Program in Entrepreneurship is required for enrollment.

ENTR 459 STARTUP FINANCE & RAISING CAPITAL FOR ENTREPRENEURS 3
Examines the sources of capital for new and growing companies with a special emphasis on angel investment, venture capital, private equity, and non-dilutive and other niche options; the management of cash flows; uses of capital; and financial statement presentation and analysis (a cornerstone of valuation, lending/borrowing, and investing). Case examples and live projects are emphasized to provide students with firsthand experience in financial decision making for startup and emerging growth businesses. Crosslisted with FINC459.

ENTR 460 HIGH TECHNOLOGY ENTREPRENEURSHIP 3
Focuses on critical financial, legal, scientific and engineering issues confronted during initial planning stages of a start-up enterprise. Students work in teams to develop a real world business product offering. May be crosslisted with ELEG460. RESTRICTIONS: Senior status, permission of instructor.

ENTR 464 SOCIAL ENTREPRENEURSHIP PRACTICUM 3
Provides students with guided reflection and learning as they engage in a practical social entrepreneurial engagement of their choice. This may include participation in established programs within the University, such as First Step Grand Challenges, Service Learning Scholar, or others; or may be an internship engagement with an organization, issue, or cause outside the University. RESTRICTIONS: Student experiences must be approved in advance by the course instructor. May be repeated one time for credit.

ENTR 601 MODELING, PROTOTYPING & TESTING 3
This course provides a toolbox for making design ideas a reality. Students will learn how to use current computer aided design and manufacturing technology to design and manufacture physical prototypes. Students will also understand and apply iterative design processes towards solving an open-ended design challenge.

ENTR 602 INDUSTRIAL DESIGN 3
Provides an introduction to the theory and practice of industrial design - an interdisciplinary field involving the engineering, manufacturing, and business aspects of new product development. Students will apply modeling, prototyping, and testing concepts to new product development. Students will be tasked with designing a commercially viable product. May be crosslisted with MEENG602. PREREQ: ENTR601 or permission from the instructor.

ENTR 616 APPLIED CREATIVITY 3
Provides foundational knowledge in research and practice of creativity theory and creative problem-solving in entrepreneurial contexts. Topics include creativity processes, including creative problem solving models and methods, idea-generating techniques, and developing a creative disposition. May be crosslisted with UAPP716.

ENTR 617 DESIGN THINKING AND INNOVATION 3
Addresses the integration and application of design processes and design thinking to enhance innovation. Students engage in multidisciplinary exploration of design theory and practice, specifically applying design ideas, principles and approaches. The role of user-centered research, divergent thinking, and iteration to enhance innovation are emphasized. May be crosslisted with UAPP717.

ENTR 620 SOCIAL ENTREPRENEURSHIP 3
This course focuses on developing creative, sustainable solutions to address societal problems. The course is designed to empower students to see social entrepreneurship as a force for social change and give them the knowledge, skills and connections needed to make an impact on the lives of others.

ENTR 650 BUS ACCELERATOR FOR ENTR VENTURES 1-3
Focus on helping students to accelerate the startup & growth of their companies. It begins with the conduct of a business model audit to determine appropriate goals/milestones. Students then develop and implement strategies to accomplish their goals/milestones. RESTRICTIONS: Permission of the Horn Program in Entrepreneurship is required for enrollment.

ENTR 651 SPECIAL TOPICS IN ENTREPRENEURSHIP 3
This course focuses on one or more special topics in entrepreneurship. Examples include: entrepreneurial leadership, influence & team building, and startup funding.

ENTR 654 INTRODUCTION TO ENTREPRENEURSHIP 3
Introduction to a repeatable method for the development of viable business models. Entrepreneurial thinking, different types of startups, unique characteristics of technology markets, and business concepts germane to entrepreneurial contexts are emphasized.

ENTR 655 STARTUP EXPERIENCE I 3
Students work together in interdisciplinary teams to learn and utilize a repeatable method for developing viable business concepts. Core topics include: customer development, lean startup, types of businesses, opportunity recognition, ideation, validation of business model hypotheses, intellectual property, business strategy, team building, and venture capital.
RESTRICTIONS: This course is part II of the Horn Program in Entrepreneurship’s Startup xExperience. Permission from the Horn Program is required.

ENTR 656 STARTUP EXPERIENCE II 3
Involves attempting to develop and launch a high growth potential business. Students work together in interdisciplinary teams to validate their business concepts, optimize business processes and strategies, and begin to acquire customers. Challenges associated with rapid growth are emphasized. PREREQ; ENTR655. RESTRICTIONS: This course is part 2 of the Horn Program in Entrepreneurship’s Startup Experience. ENTR655 or permission from the Horn Program is required.

ENTR 657 LEGAL ISSUES FOR ENTREPRENEURS 3
Explores important legal issues faced by entrepreneurs as they put their ideas into action. Topics are sequenced to mirror the entrepreneurial process, beginning with pre-startup issues like partnership agreements and intellectual property, continuing to entity formation, governance and ownership issues, and ending with emerging growth and exit transactions. May be crosslisted with ACC7657.
ENTR 658  APP DEVELOPMENT FOR NEW TECHNOLOGY  3
Introduces students to key issues associated with developing applications of new technologies. Students work together in teams to complete proof of concept testing that typically involves primary and secondary market research and an assessment of technological feasibility, value, and use for specific applications.

ENTR 659  STARTUP FINANCE & RAISING CAPITAL FOR ENTREPRENEURS  3
Examines the sources of capital for new and growing companies with a special emphasis on angel investment, venture capital, private equity, and non-divulgeable and other niche options; the management of cash flows; uses of capital; and financial statement presentation and analysis (a cornerstone of valuation, lending/borrowing, and investing). Case examples and live projects are emphasized to provide students with firsthand experience in financial decision making for startup and emerging growth businesses. Crosslisted with FINC659.

ENTR 660  HIGH TECHNOLOGY ENTREPRENEURSHIP  3
Focuses on critical financial, legal, scientific and engineering issues confronted during initial planning stages of a start-up enterprise. Students work in teams to develop a business plan for a real world business product offering.

ENTR 665  USER-CENTERED RESEARCH METHODS FOR ENTREPRENEURSHIP  3
Provides foundational tools for understanding customer and societal issues on an individual and contextualized level. User-centered research methods such as observation, depth interviewing, cultural consensus analysis and projective techniques are applied to identifying problems, unmet needs and opportunities. User-centered methods are also utilized to guide idea generation and solution testing as students engage in real-world application across a variety of fields.

ENTR 666  SPECIAL PROBLEM  1-12

ENTR 815  ETHICS, BUSINESS AND COMMUNICATION  3
Provides professional development in ethics, business and communication related to systems biology research applications in stem cell, tissue engineering, and drug delivery technologies. Intended for PhD students in interdisciplinary life science and engineering programs. Crosslisted with BINF815.

ENVRI 101  INTRODUCTION TO THE ENVIRONMENT  3
Broad overview of the fields of environmental science and environmental studies. Introduction to the spectrum of science and policy that is associated with environmental work and explore specific issues, perspectives and approaches from these varied areas.
Crosslisted with ENSC101. RESTRICTIONS: Open to Freshman ENSC or ENVRI majors only.

ENVRI 300  EARTH SYSTEMS: SCIENCE AND POLICY  3
Integrative framework necessary to understand the systems approach to environmental science and its interaction with environmental policy and management. Introduction to systems theory within environmental science and its relevance to environmental policy.
Crosslisted with ENSC300. RESTRICTIONS: Environmental Science and Studies Majors only.

ENVRI 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.
Crosslisted with ENSC450. RESTRICTIONS: Open to environmental science and studies majors only, or requires permission of instructor.

ENVRI 464  ENVIRONMENTAL INTERNSHIP  3-6
Internship experience that integrates environmental science and/or studies learning goals in an experiential environment. To satisfy the Field Experience requirement, the internship MUST include data collection, analysis and interpretation and weekly reports/logs that include student reflection on the internship experience. Internship must be approved by the environmental science and studies program and include oversight by a faculty member.
Crosslisted with ENSC464. RESTRICTIONS: May be repeated up to six credits.

ENVRI 468  HONORS: DIRECTED RESEARCH  3-6
Constitutes a directed research experience for honors students. Topics of research will be in the realm of environmental science and/or studies, depending on the interests and expertise of the student and supervising faculty member.
Crosslisted with ENSC468. RESTRICTIONS: Honors Only.

ENTOMOLOGY AND WILDLIFE CONSERVATION

ENWC 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.

ENWC 165  NEW STUDENT SEMINAR  1
Study and careers in entomology and wildlife conservation: opportunities, expectations, duties and preparation, including skills for success in college. Readings, discussions, written and oral assignments, speakers and field trips. RESTRICTIONS: First term majors.

ENWC 166  SPECIAL PROBLEM  1-3

ENWC 201  WILDLIFE CONSERVATION AND ECOLOGY  3
Basic principles of ecology. Ecological and sociological problems and solutions in the conservation of biodiversity (i.e., habitat, species, and genetic variety). RESTRICTIONS: Should precede BISC302.

ENWC 205  INSECTS AND SOCIETY  3
Examines insects up close and personal! Topics include insect life history, behavior, basic insect identification, relationships between structure and function, ecology, evolution, pest control, insect's impact on human culture and society and historical information.

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

ENWC 215  INSECTS AND SOCIETY LABORATORY  1
Insect structure, physiology, behavior, taxonomy, evolution and ecology studied through field trips, dissection and experiments. Insect collection (with identification to orders) required. COREQ: ENWC205.

ENWC 224  APOLOGY AND APICULTURE LABORATORY  1
Laboratory and field course to complement topics in ENWC214. Bee identification and culture; hive management. Work with bees in an apiary to develop confidence in keeping bee colonies. COREQ: ENWC214.

ENWC 300  PRINCIPLES OF ANIMAL AND PLANT GENETICS  3
Introduction to the theory and application of genetics as related to the improvement of plants and animals. Crosslisted with ANFS300. PREREQ: PLSC101 or BISC207 or BISC208.

ENWC 310  ANIMAL AND PLANT GENETICS LABORATORY  1
Laboratory exercises concerning genetic concepts, methods and applications using various plant and animal systems. Crosslisted with ANFS310. COREQ: ANFS300.

ENWC 311  INSECTS IN AGRICULTURAL AND URBAN ENVIRONMENTS  3
Examination of a selection of insects associated with crops, forests, natural areas, gardens, and yards. Emphasis is on getting to know key features of a representation of insect species in the agricultural and urban environments that affect the life and commerce of people including their impactful significance and ecological associations. PREREQ: ENWC205 or BISC208.

ENWC 312  FIELD ECOLOGY  3
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. Crosslisted with BISC312. PREREQ: BISC302.

ENWC 314  COMPARATIVE TERRESTRIAL AND MARINE ECOLOGY  3
Comparative overview of similarities and dissimilarities of life in terrestrial and marine environments. Topics include geological history, subsistence, growth and development, life history, reproduction, dispersal, population regulation, and impact of humans. May be crosslisted with MAST314. PREREQ: BISC208.

ENWC 325  WILDLIFE MANAGEMENT  3
Introduction to solving wildlife management problems. Development of management plan with consideration of habitat, human and animal population components. PREREQ: ENWC201. RESTRICTIONS: Requires sophomore status.
ENWC 346  INSECT ECOLOGY AND CONSERVATION  3
A survey of the many ways insects interact with their biotic and abiotic
environments; why such interactions determine terrestrial ecosystem diversity
and function; and strategies for sustaining productive insect communities.

ENWC 351  NATURE AND WILDLIFE PHOTOGRAPHY  3
Basic principles and techniques of nature and wildlife photography. Students
execute projects that demonstrate their technical skill and knowledge of
exposure, composition and content.
RESTRICTIONS: Students must have own camera equipment. Usually offered as
part of international or domestic trips in Winter or Summer Sessions.

ENWC 366  INDEPENDENT STUDY  1-6

ENWC 405  INSECT ANATOMY AND PHYSIOLOGY  3
Examines morphological and physiological adaptations of insects from an
evolutionary perspective. Includes the functional anatomy of insects (both internal
and external) and how organ systems carry out their physiological tasks. Considers
the insect "groundplan" (in comparison to other arthropods), and reviews all the
major organ systems, their functions, and how they carry out these functions.
Laboratory emphasizes anatomical variation of external and internal systems of
insects and techniques for their study.
PREREQ: ENWC205, or equivalent. RESTRICTIONS: ENWC215 is recommended.

ENWC 406  INSECT IDENTIFICATION - TAXONOMY  4
Lecture and laboratory; the collection, preservation and classification of common
insect families.
PREREQ: ENWC205.

ENWC 408  INSECT FIELD TAXONOMY  3
Collection, preservation and classification of common insect families. Includes
lecture and laboratory.
PREREQ: ENWC406.

ENWC 410  MEDICAL, VETERINARY, AND FORENSIC ENTOMOLOGY  3
Ecology, transmission, and control of diseases carried by insects, ticks and mites;
interactions of vectors, animal hosts, and humans. Biting and stinging arthropods
and forensic entomology, including evidence collection and species succession.
Labs and field trips emphasize identification and field assessment of medically
important arthropods.
PREREQ: BISC208, ENWC205, or permission of instructor.

ENWC 411  INSECT PEST MANAGEMENT  3
Principles of managing insect populations in an environmentally compatible
manner to reduce losses caused by insects attacking our food, fiber, buildings,
domestic animals and human populations. Diagnostic recognition, control and
habits of major pest species.
PREREQ: ENWC205

ENWC 413  WILDLIFE POLICY AND ADMINISTRATION  3
This course is an introduction to policy issues that relate to wildlife management
and natural resources. Students will gain an understanding of current laws, federal
agencies, policy formation, and debate the policies of current hot topics.
May be crosslisted with ENEP413.
PREREQ: ENWC201. RESTRICTIONS: Open to
juniors and seniors only.

ENWC 415  WILDLIFE RESEARCH TECHNIQUES  3
Research design, field sampling techniques, data analysis and interpretation, and
preparation of publication quality manuscripts.
PREREQ: ENWC325. RESTRICTIONS: Open only to seniors.

ENWC 416  WILDLIFE HABITAT MANAGEMENT  3
Students will be introduced to basic principles and methods of wildlife habitat
management in forests, grasslands, wetlands, agriculture, and urban areas. Labs
include field trips to visit various habitats and learn about habitat management
directly from local wildlife professionals. Field clothes required.

ENWC 418  ORNITHOLOGY  3
Avian biology: diversity, evolution, form and function, behavior and
communication, reproduction and development, and conservation. Natural
history and identification of taxa. Labs with frequent field trips.
PREREQ: BISC208.

ENWC 419  BIOLOGICAL CONTROL  3
The use of beneficial organisms to manage and control populations of other
organisms. Theory, practices, and case histories for manipulation of natural
enemies to minimize the impact of pests.
PREREQ: ENWC205 or equivalent. RESTRICTIONS: Requires junior or senior
status.
ENWC 468    RESEARCH    1-6

ENWC 602    LARVAL TAXONOMY    4
Lecture-laboratory treating the collection, preservation and classification of immature stages of insects. Emphasis on holometabolous orders, with special attention to aquatic immatures. PREREQ: ENWC215 and ENWC406.

ENWC 605    INSECT ANATOMY AND PHYSIOLOGY    3
Examines morphological and physiological adaptations of insects from an evolutionary perspective. Includes the functional anatomy of insects (both internal and external) and how organ systems carry out their physiological tasks. Considers the insect “groundplan” (in comparison to other arthropods), and reviews all the major organ systems, their functions, and how they carry out these functions. Laboratory emphasizes anatomical variation of external and internal systems of insects and techniques for their study.

ENWC 606    INSECT IDENTIFICATION - TAXONOMY    4
Collection, preservation and classification of common insect families. Includes lecture and laboratory.

ENWC 608    INSECT FIELD TAXONOMY    3
The collection, classification, preservation and curation of insects. An insect collection is required. PREREQ: ENWC606

ENWC 610    MEDICAL, VETERINARY, AND FORENSIC ENTOMOLOGY    3
Ecology, transmission, and control of diseases carried by insects, ticks and mites; interactions of vectors, animal hosts, and humans. Biting and stinging arthropods and forensic entomology, including evidence collection and species succession. Labs and field trips emphasize identification and field assessment of medically important arthropods. PREREQ: BISC208, ENWC205 or permission of instructor.

ENWC 611    INSECT PEST MANAGEMENT    3
Principles of managing insect populations in an environmentally compatible manner to reduce losses caused by insects attacking our food, fiber, buildings, domestic animals, and human population. Diagnostic recognition, control and habits of major pest species. PREREQ: ENWC205

ENWC 613    WILDLIFE POLICY AND ADMINISTRATION    3
Introduction to policy issues that relate to wildlife management and natural resources. Students will gain an understanding of current laws, federal agencies, policy formation, and debate the policies of current hot topics. May be crosslisted with ENEP613. RESTRICTIONS: Open to graduate students only or by permission of instructor.

ENWC 615    WILDLIFE RESEARCH TECHNIQUES    3
Research design, field sampling techniques, data analysis and interpretation, and preparation of publication quality manuscripts. Class and individually designed field projects focus on regional wildlife and their habitats. PREREQ: ENWC325; FREQ408 or STAT200; and two courses from ENWC318, ENWC418, ENWC424, or ENWC425. COREQ: PLSC212 or PLSC402 or ENWC344. RESTRICTIONS: Open to graduate students only or by permission of instructor.

ENWC 616    WILDLIFE HABITAT MANAGEMENT    3
Students will be introduced to basic principles and methods of wildlife habitat management in forests, grasslands, wetlands, agriculture, and urban areas. Labs include field trips to visit various habitats and learn about habitat management directly from local wildlife professionals. Field clothes required.

ENWC 618    ORNITHOLOGY    3
Avian biology: diversity, evolution, form and function, behavior and communication, reproduction and development, and conservation. Natural history and identification of taxa. Labs with frequent field trips. PREREQ: BISC208.

ENWC 619    BIOLOGICAL CONTROL    3
Use of beneficial organisms to manage and control populations of other organisms. Theory, practices, and case histories for manipulation of natural enemies to minimize the impact of pests.

ENWC 620    BEHAVIORAL ECOLOGY    3
Theoretical treatment of the factors that have dominated the evolution of animal behavior; hypothesis testing emphasized. PREREQ: BISC302

ENWC 624    HERPETOLOGY    3
Biological and ecological patterns of reptiles and amphibians. Evolution, feeding behavior, life history, reproduction, physiology, population structure and dynamics, migration and movements, and conservation.

ENWC 625    MAMMALOLOGY    3
Mammal biology: evolution, feeding, homeostasis, communication and reproduction. Natural history and identification of taxa. Occasional field trips. PREREQ: BISC208 RESTRICTIONS: Open to graduate students only or by permission of instructor.

ENWC 626    AQUATIC INSECTS    3

ENWC 635    POPULATION ECOLOGY    3
Understand population processes by combining a discussion of theory and practical applications. Includes exponential, logistic, and age-specific growth as well as predation, competition, disease, and metapopulations. Model-building exercises actively used to understand theoretical dynamics. May be crosslisted with BISC635. RESTRICTIONS: Requires permission of instructor.

ENWC 652    CONSERVATION OF AFRICAN WILDLIFE    3

ENWC 653    COMMUNITY-BASED CONSERVATION    3
Basic philosophical, economic, and ecological aspects of the bottom-up approach to conservation. Students experience this form of conservation first-hand by living with aboriginal people and seeing how they conserve natural resources. RESTRICTIONS: Offered only during Winter Session in Tanzania.

ENWC 656    CONSERVATION BIOLOGY    3
Biological principles to the conservation of biological diversity. Integrates topics, and theories from ecology, economics, genetics, biogeography, behavior, reproductive biology, sociology, and wildlife management. Divided into four parts; 1) describing patterns and scales of biological diversity, 2) examining threats 3) managing populations and ecosystems, 4) social aspects of conservation. RESTRICTIONS: Requires junior status.

ENWC 805    INSECT-PLANT CHEMICAL ECOLOGY    3
Chemically mediated interactions between insects and plants and other organisms involved in the relationship. Perceptual organs, behavioral and physiological response, plant-insect interactions, insect and plant defense, and intraspecific interactions that relate to natural chemicals produced by plants and insects. Presentation-discussion format. May be crosslisted with PLSC805.

ENWC 814    ADVANCED ECOLOGY    3
Interaction of animals with their environment as it influences their distribution, abundance, life history and evolution. Emphasis on primary research literature. PREREQ: BISC302 or equivalent

ENWC 815    READINGS IN ECOLOGY    1
Discussion-based seminar on a current text and/or topic in the ecological sciences.

ENWC 820    LANDSCAPE ECOLOGY    3
Topics include advanced theoretical principles and methods to explore spatial and temporal relationships among landscape elements, organisms, populations, and ecosystems; causes of landscape pattern; measuring landscape pattern using GIS software, and application of landscape ecological principles in conservation management.

ENWC 821    WILDLIFE SPATIAL ECOLOGY    3
Explore various methods to analyze wildlife spatial data, including advanced GIS techniques, Resource Selection Models and Species Distribution Models in R and WinBUGS, and the use of standalone programs like MAXENT and PRESENCE.

ENWC 868    RESEARCH    1-9

ENWC 869    MASTER'S THESIS    1-6
ENWC 870  GRADUATE RESEARCH SEMINAR  0 PF
Students give an oral scientific presentation that describes the theory and development of their individual research projects.

ENWC 888  TOPICS IN ENTOMOLOGY AND WILDLIFE ECOLOGY  0 PF
Seminar with lectures on a variety of topics related to entomology and wildlife ecology.

ENWC 964  PRE-CANDIDACY STUDY  1-12 PF
Research and readings in preparation of dissertation topic and/or qualifying examinations for doctoral students before admission to candidacy but after completion of all required course work. RESTRICTIONS: Not open to students who have been admitted to candidacy.

ENWC 969  DOCTORAL DISSERTATION  1-12 PF

FASH 114  FASHION, STYLE AND CULTURE  3
Introduces the concepts of fashion, style, and culture as they relate to how products are conceived and developed. The impact of cultural contexts and societal diversity on apparel industry practices are considered.

FASH 122  APPAREL PRODUCT ASSEMBLY  3
Basic clothing construction procedures, fitting techniques and methods of evaluation for apparel are addressed. Construction skills are developed through a set of seam samples and construction of a blouse and skirt using a commercial pattern.

FASH 133  FASHION ART STUDIO  3
Explore basic design elements and principles, develop creative design studio skills, and apply them to apparel design and merchandising specific solutions. A variety of traditional and digital art methods will be utilized.

FASH 165  FASHION AND APPAREL STUDIES SEMINAR  1 PF
Create awareness of career opportunities and develop techniques for success in the fields of fashion merchandising and apparel design.

FASH 180  APPAREL PRODUCT DEVELOPMENT  3
Course focuses on the concepts of apparel product development: The product development calendar, the components of a garment and how the garment is assembled, sizing, fit, costing, garment specifications, and the apparel production process.

FASH 210  SEMINAR ON FASHION AND SUSTAINABILITY  3
Introduction to emerging cannon of theory and practice regarding Sustainability as it relates to fashion. Centered on four components of Sustainability and Social Responsibility: Labor, Environment, Consumption and Body Image. RESTRICTIONS: Apparel design and fashion merchandising majors only.

FASH 213  TWENTIETH CENTURY DESIGN: ETHNIC INFLUENCE  3
Examines the culture and clothing practices of various ethnic groups and their influences on Western apparel fashion and textile arts during the 20th Century.

FASH 214  COSTUME HISTORY BEFORE 1600  3
Costume as a mirror of civilization in Western Europe and the Middle East from antiquity through the 16th century. Influence of societal, economic and aesthetic factors upon the development of costume.

FASH 215  FUNDAMENTALS OF TEXTILES I  3
Science principles are the basis for understanding fibers. Relationships between the chemical and physical characteristics of fibers and properties such as tensile strength, flammability, elasticity, moisture absorption, dye affinity, and recyclability are explored. Understanding science principles in relation to textile properties provides basis for evaluation of textile products. PREREQ; CHEM101. RESTRICTIONS: Limited to majors only.

FASH 218  INTRODUCTION TO FASHION BUSINESS  3
An overview of the fashion business by examining the fundamental concepts and strategies related to merchandising and retailing of fashion and apparel products. Current practices and trends in the fashion industry are examined.

FASH 220  FUNDAMENTALS OF TEXTILES II  3
Fundamental concepts related to yarns, fabric, structures, coloration and finishes. Emphasis placed upon structural properties as they related to end-use and characteristics and finishing processes. Discusses environmental problems related to textile production, dyeing and finishing. PREREQ; FASH215 RESTRICTIONS: Fashion merchandising and apparel design majors only.

FASH 221  APPAREL STRUCTURES  3
Comparative study of foundation principles and processes of apparel design and production utilizing draping, flat pattern, drafting and computer-aided design techniques. Includes development of master patterns, execution of advanced garment assembly processes, and communication of design plans using effective layout and presentation skills. Apparel design problems introduce the interplay among functional, aesthetic, social, technical, and sustainable factors. PREREQ: FASH122.

FASH 224  CLOTHING DESIGN AND PRODUCTION: 1600 TO THE EDWARDIAN PERIOD  3
Clothing design and production in America and Western Europe since 1600. Study of craft skills, growth of ready-to-wear industry, and Haute Couture.

FASH 233  FASHION DRAWING AND RENDERING  3
Drawing from the fashion model; emphasis on rendering clothing character, fabrics and fashion details using various media; introduction to flat sketching via computer; translation of drawings to finished fashion illustrations. PREREQ: FASH133.

FASH 314  APPAREL DESIGN BY FLAT PATTERN  3
Advanced flat pattern and drafting using the torso block to design tailored jackets and coats through the lenses of aesthetics, function/fit, sustainability, and marketability. Design projects require research of a design concept for a target market, consideration of sustainable design solutions, sketching, development of presentation boards, patternmaking, and construction of a complete garment. PREREQ: FASH221.

FASH 319  DRESS AND CULTURE  3
Examination of similarities and differences in the dress of culturally distinct groups: analysis of functions served by dress and factors influencing changes in cultural forms of dress. PREREQ: PSYC100 and/or SOCI201.

FASH 320  FASHION AND APPAREL INTERNSHIP  1-12 PF
An off-campus supervised and coordinated field study program in fashion/apparel related areas. PREREQ: FASH218. RESTRICTIONS: Requires permission of instructor.

FASH 321  TRAVEL STUDY PROGRAM  1-6 PF
Study of the domestic and/or international textiles and apparel and allied fashion industries through a variety of instructional methods including industry visits, research projects and service learning activities. Instructional methods vary by countries visited and courses offered. RESTRICTIONS: Requires FASH faculty approval through an application process. Offered at regular intervals.
FASH 324  APPAREL DESIGN BY DRAPING  3
Exploration of three dimensional methods of apparel design. Focuses on design and execution of draped garment structures. Design projects require research of a design concept for a target market, consideration of sustainable design solutions, sketching, development of presentation boards, patternmaking, and construction of a complete garment.
PREREQ: FASH33, FASH314. COREQ: FASH220.

FASH 325  MULTIMEDIA FASHION PRESENTATIONS  3
Development of oral, written, and graphic presentation skills used for communication in the fashion industry. Multimedia presentation applications are utilized.

FASH 330  MERCHANDISE PLANNING  3
Focuses on computer applications related to mathematical concepts and calculations used in developing merchandise budgets. Spreadsheets are used to develop merchandising plans for sales, inventories, markdowns, shrinkage, receipts, open-to-buy and gross margin. Other industry-related planning systems are examined.
PREREQ: FASH218, ACCT207 or ACCT200, and MISY160.

FASH 333  FASHION FORECASTING AND DESIGN  3
Introduction to trend research, analysis, and translation to original textile and apparel collections targeting varied consumer markets. Advanced computer graphics for the fashion industry, emphasizing concept development (textiles, apparel, sustainable design, etc.) visualization, and design presentation.
PREREQ: FASH233 and FASH220.

FASH 355  INTL FASHION CONSUMER AND RETAILERS  3
Global and country specific factors that impact distribution systems for and consumption of fashion related products. Understanding consumers of fashion products within a global context and motivations for pursuing a global marketing and retailing strategy, including store-level sustainability practices.
PREREQ: FASH218 or BUAD301.

FASH 366  INDEPENDENT STUDY  1-6

FASH 380  ADVANCED APPAREL PRODUCT DEVELOPMENT  3
The product development process as applied in the apparel industry. Focuses on business planning, marketing, research, distribution, the product development calendar, and challenges relating to apparel business situations. Evaluates how product development activities supports sustainability. Builds on basic information learned in FASH180.
PREREQ: FASH218, FASH180, FASH220.

FASH 417  FASHION AND APPAREL STUDIES RESEARCH AND DISCOVERY  3
Explores current issues and challenges in the fashion and apparel industry and the role of research and discovery of new knowledge for solving them. Students apply knowledge about research methods and discovery in carrying out projects generating new knowledge and solutions. Research outcomes are communicated appropriately for a targeted audience of academics or industry professionals.
RESTRICTIONS: Junior status.

FASH 419  SOCIAL PSYCHOLOGICAL ASPECTS OF CLOTHING  3
Study of clothing and appearance as contributors to human interactions; consideration of the importance of clothing in individual and collective behavior. Analysis of how dress reflects self-feelings, establishes social identities and affects interpersonal encounters. May be crosslisted with WOMS419. PREREQ: PSYC100 and SOCI120, or permission of instructor.

FASH 420  ASSORTMENT PLANNING, SOURCING AND BUYING  3
A continuation of FASH330. A merchandise budget developed in FASH330 is translated into an inventory unit plan. Emphasis is on assortment planning, and responsible sourcing and purchasing. Computer applications are involved.
PREREQ: FASH330.

FASH 421  PROFESSIONAL PORTFOLIO DEVELOPMENT  3
Conceptualization and development of a professional portfolio of design work. Refinement of visual presentation skills and professional development emphasized. Includes critique by apparel industry professionals.
PREREQ: FASH333.

FASH 426  HISTORIC TEXTILES & CLOTHING COLLECTION MANAGEMENT  3
Practicum at the University of Delaware Historic Costume and Textiles Collection. Learn proper care, storage and exhibition techniques for flat textiles, apparel and accessories. Experiences may include museum education, object accession, and database management.

FASH 430  APPAREL BRAND MANAGEMENT & MARKETING  3
A study of the significance of brand management for fashion companies as a competitive strategy for building sales and customer base. Introduction to the essential elements of branding, the course covers major activities of brand management and marketing with a focus on apparel firms. Apparel branding examined in global context due to the global nature of industry and its impact on consumers around the world.
PREREQ: FASH218 and BUAD301.

FASH 433  PRODUCT DEVELOPMENT AND MANAGEMENT STUDIO  3
Focuses on all phases of apparel product development for a targeted market from conceptualization through execution of sample garments for sustainable mass production. Further develops skills in computer-aided pattern designing, grading, marker making and data management (e.g., sizing, specifications, operations and costing), includes a cooperative project with an apparel firm to provide hands-on industry experience. Includes field trip.
PREREQ: FASH314, FASH333.

FASH 455  GLOBAL APPAREL AND TEXTILE TRADE AND SOURCING  3
Global interdependencies that influence production, distribution, and consumer consumption. Study of the roles of government, industry, and consumers in the global economy with a focus on the apparel industry. Analyzes practices to improve sustainability in production of apparel.
PREREQ: ECON151 or ECON152.

FASH 466  INDEPENDENT STUDY  1-6

FASH 484  DESIGN EXPRESSIONS  3
Integrates advanced apparel design techniques and experiences as students design a collection of ensembles based on a theme incorporating social, cultural, and environmental sustainability. Articulating the design process through oral, written, and visual methods is emphasized.
PREREQ: FASH220, FASH234, FASH333. RESTRICTIONS: Apparel Design Seniors only.

FASH 490  STRATEGIC FASHION MANAGEMENT  3
A capstone course that integrates product planning and development, distribution, marketing, sourcing, and sustainability. Students will work on case studies and industry projects that require analysis, synthesis and application of knowledge and skills within the global apparel industry.
PREREQ: FASH330, FASH355, and FASH380.

FASH 619  SOCIAL PSYCHOLOGICAL ASPECTS OF CLOTHING  3
Study of clothing and appearance as contributors to human interactions; consideration of the importance of clothing in individual and collective behavior. Analysis of how dress reflects self-feelings, establishes social identities and affects interpersonal encounters.

FASH 620  FASHION AND APPAREL STUDIES GRADUATE INTERNSHIP  1-3
An off-campus supervised and coordinated field study program in fashion/apparel related areas that allows students to apply acquired knowledge and skills in a corporate or professional setting.

FASH 626  HISTORIC TEXTILES & CLOTHING COLLECTION MANAGEMENT  3
Practicum at the University of Delaware Historic Costume and Textiles Collection. Learn proper care, storage and display techniques for flat textiles, apparel and accessories. Experiences may include museum education, object accession, and database management.

FASH 630  APPAREL BRAND MANAGEMENT & MARKETING  3
A study of the significance of brand management for fashion companies as a competitive strategy for building sales and customer base. Introduction to essential elements of branding, the course covers major activities of brand management and marketing with a focus on apparel firms. Apparel branding examined in global context due to the global nature of industry and its impact on consumers around the world.
PREREQ: Graduate standing. RESTRICTIONS: Not open to students with credit for FASH430.

FASH 633  PRODUCT DEVELOPMENT AND MANAGEMENT STUDIO  3
Apparel product development for a targeted market from conceptualization through execution of sample garments for mass production. Develop skills in computer-aided pattern designing, grading, marker making and data management (e.g., sizing, specifications, operations and costing). Includes field trip.
PREREQ: Requires permission of instructor.
FASH 655  GLOBAL APPAREL AND TEXTILE TRADE AND SOURCING  3
Analyzes the global apparel and textile industries, the supply chains and the economic, political, socio-cultural, geographical and technological factors that influence global sourcing and buying decisions. Considers the importance of both financial and social goals, and strategies for social responsibility and labor compliance, and strategies for sourcing apparel.
PREREQ: Graduate standing. RESTRICTIONS: Not open to students with credit for FASH455.

FASH 665  FASHION STUDIES GRADUATE SEMINAR  1 PF
Exploration of current research and industry needs in the field.
RESTRICTIONS: Must be taken during the final semester of the master's degree.

FASH 666  SPECIAL PROBLEM  1-6
Individual study, individual service learning project, group experiential learning (e.g., travel, internship, service learning), research that allows students to synthesize learnings across courses.

FASH 669  PROFESSIONAL PROJECT IN FASHION AND APPAREL STUDIES  1-3
Engage in all phases of a professional project under the guidance of a faculty member and document the results in written form. The professional project should reflect the ability to conduct an individual study, individual service learning project, group experiential learning, or research project in which students synthesize learning across courses in the Fashion and Apparel Studies M.S. program.
RESTRICTIONS: If choosing professional project option, a student must complete a total of 3 credits of FASH 669 during the M.S. study in Fashion and Apparel Studies.

FASH 689  APPAREL SUPPLY CHAINS AND SOCIAL RESPONSIBILITY  1
Challenges for social responsibility in context of structure, relationships and long-standing practices and methods in apparel business. Examines structural and competitive issues of supply chains such as ownership, globalization, and outsourcing.

FASH 691  SOCIALLY RESPONSIBLE APPAREL: GLOBAL POLICY  1
Political and profit interests that influence socially responsible decisions and policy for the global textile and apparel industry are considered. Factors analyzed include ethics, economics, governmental policies, international labor standards, environmental regulations, and company priorities.

FASH 692  SUSTAINING GLOBAL APPAREL SUPPLY CHAINS  1
Examines responsibility of businesses for sustaining economic/social development in global apparel industry. An historical perspective of the role of the industry in economic development provides a context for evaluating current issues concerning sustainable development.

FASH 693  CULTURE AND WORK IN THE APPAREL INDUSTRY  1
Examines interrelationships between cultural characteristics, employment/work practices and social responsibility. Examples of industry practices that reflect effects of culture on business practices are addressed.

FASH 694  APPAREL CONSUMERS AND SOCIAL RESPONSIBILITY  1
Examines role of consumers in improving working conditions, labor standards, and environmental stewardship in apparel factories worldwide. Factors and groups motivating consumer action are explored, including influence of personal characteristics, market opportunities, and activist and other pressure groups.

FASH 695  BRINGING SOCIAL RESPONSIBILITY TO APPAREL CORPORATE CULTURE  1
Importance of leadership, the role of inspirational leadership, and the opportunities for making a difference are explored, analyzed and applied. Emphasis on social change - how individuals can help build a socially responsible workplace.

FASH 696  CURRENT INITIATIVES FOR APPAREL INDUSTRY LABOR COMPLIANCE  1
Evaluates effectiveness of current initiatives for improving working conditions and labor standards in factories around the world. Explores codes of conduct and new trends for achieving long-term improvements in compliance to internationally recognized labor standards.

FASH 697  WORKER-CENTRIC SOCIAL RESPONSIBILITY FOR APPAREL INDUSTRY  1
Examines the rights of workers. Explores obstacles in meeting and methods for assuring worker rights, including freedom of association. Consideration is given to how to effectively engage with workers.

FASH 698  REDESIGNING GREEN APPAREL: DESIGN, SOURCING AND PACKAGING  1
Examines challenges to environmental stewardship in the design, sourcing, and packaging of apparel, textiles, and footwear products. Explores innovative practices, visionary leadership, and social change strategies for redesigning 'green' in the context of the design and sourcing roles of apparel business.

FASH 699  PRODUCING ENVIRONMENTALLY RESPONSIBLE APPAREL  1
Examines environmentally responsible apparel production and practices as philosophy, process, and competitive business strategy. Examines sustainable production in the context of a business' physical plant, materials, and resource use.

FASH 800  RESEARCH ANALYSIS IN FASHION STUDIES  3
Analysis and interpretation of research in fashion and apparel studies. Examination of qualitative and quantitative research methodologies. Emphasis is placed on theory development and research design.

FASH 822  GLOBAL FASHION CONSUMERS  3
Study of consumer behavior toward fashion products in a global context. Theories will be investigated from the context of the required readings.

FASH 824  CREATIVE DESIGN FOR EXHIBITION  3
Use of advanced apparel design techniques in the development and execution of a collection of garments for juried design exhibition.

FASH 825  INTERDISCIPLINARY APPROACHES TO CREATIVE PROBLEM SOLVING  3
Interdisciplinary approaches to collaborative thinking and problem solving, implementing variety of methods (e.g., environmental scanning, concept/knowledge mapping, scenario building, futuring/forecasting, visioning, scenario building, strategic planning) to the sustainable resolution of global contemporary issues challenging the textile/apparel/retail complex.

FASH 868  SUPERVISED RESEARCH IN FASHION STUDIES  1-3
Exploration of the academic research process, encompassing its conceptualization, design, execution, and dissemination phases.

FASH 869  THESIS  1-6
Engage in all phases of original scholarship under the guidance of their graduate committee and document the results in written form, including the process.

FINANCE

FINC 120  INVESTMENT CLUB  1
Prepares students interested in joining Blue Hen Investment Club (BHIC). Objectives is to educate future members of BHIC to make better informed investment decisions. Students get hands-on experience learning.

FINC 200  FUNDAMENTALS OF FINANCE  3
Provides non-business majors with an overview of the role of finance within a business organization. Topics include financial statement analysis, time value of money, capital budgeting, valuation and the cost of capital.
RESTRICTIONS: No majors within business administration, finance or accounting, HRIM or MIS degree candidates may receive credit for this course.

FINC 266  SPECIAL PROBLEM  1-3

FINC 311  PRINCIPLES OF FINANCE  3
Introduces fundamental techniques and concepts related to the financial management of business firms. Topics include the time value of money, valuation, capital budgeting, working capital management, cost of capital, capital structure analysis, short and long term financing.
PREREQ: ACCT207 and MATH201. PREREQ for HRIM majors: ACCT207 and MATH201 or STAT200. RESTRICTIONS: Open to Sophomores, Juniors, and Seniors only. Open to students whose major requires this course.
FINC 312  INTERMEDIATE FINANCIAL MANAGEMENT  3
Focuses on the role of the corporate financial manager in shareholder wealth maximization. Enhances the understanding of material covered in FINC311 through the application of analytical methods, cases and the effective use of information technology in a contemporary financial environment.
PREREQ: MATH201 and MATH202 or MYS262 and FINC311. RESTRICTIONS: Grade of C- or better required in MATH201 and MATH202 or MYS262 and FINC311. Open to Junior and Senior Finance majors and MYS majors with Finance concentrations only.

FINC 313  FIXED INCOME SECURITIES  3
Overview of the fixed income markets and instruments within those markets. Focus is on valuation and analysis of fixed income instruments and the roles of different participants within the fixed income markets.
PREREQ: FINC311. RESTRICTIONS: Requires a grade of C- or better in FINC311. Open to Junior and Senior Finance and Accounting majors only.

FINC 314  INVESTMENTS  3
Examines the valuation of securities, the functioning of securities markets and the theory and practice of modern portfolio management. Topics include advanced techniques in security valuation, standards and practices in investment management, portfolio evaluation standards and applications using real-time data.
PREREQ: MATH202 or MYS262 and FINC311. RESTRICTIONS: Grade of C- or better required in MATH201 and MATH202 or MYS262 and FINC311. Open to Junior and Senior Finance majors and MYS majors with Finance concentrations only.

FINC 320  PRINCIPLES OF FINANCIAL PLANNING  3
Introduces the financial planning process and provides an overview of the specific areas of risk management and insurance, retirement, and investments. Topics include personal financial statements, cash flow and debt management, asset acquisition, education planning, the regulatory environment, the business of financial planning and ethics.
PREREQ: FINC311. RESTRICTIONS: Grade of C- or better required in FINC311. Required course for Financial Planning Major and may be a professional elective for Finance Major.

FINC 321  INSURANCE PLANNING  3
Examines insurance and risk management decisions in personal financial planning. Topics include life, medical, disability, property, casualty, homeowners, liability, and auto insurance. Other topics include tax issues, annuities, group life insurance, long term care, and business insurance.
PREREQ: FINC311. RESTRICTIONS: Grade of C- or better required in FINC311. Required course for Financial Planning Major and may be a professional elective for Finance major.

FINC 322  RETIREMENT PLANNING  3
Focuses on public (Social Security, Medicare, and Medicaid) and private (defined benefit and defined contribution plans) retirement plans and discusses issues that individuals face in retirement such as life-style choices and medical issues.
PREREQ: FINC311. RESTRICTIONS: Grade of C- or better required in FINC311. Required course for Financial Planning Major and may be a professional elective for Finance major.

FINC 364  FINANCE IN PRACTICE  3
Requires completion of at least 120 hours of finance-related internship with verification by the hiring company. Term paper relating the real-world duties and experiences of the internship to principles learned in the classroom also required.
PREREQ: FINC311. RESTRICTIONS: Registration by permission of the instructor only.

FINC 366  INDEPENDENT STUDY  1-6

FINC 392  SEMINAR ON INTERNATIONAL FINANCIAL MANAGEMENT  3
Seminar at an overseas location on selected topics in international financial management. Combines lectures and visits to local organizations. Research paper.
PREREQ: FINC311. RESTRICTIONS: Used only as a professional elective for finance majors. Taught abroad.

FINC 412  CAPITAL MARKETS & FINANCIAL INSTITUTIONS  3
Examines various types of financial institutions. Topics include structure, performance, asset/liability management, regulation and current issues that impact operational structures.
PREREQ: FINC314 and ECON308. RESTRICTIONS: Open to Junior and Senior Finance Majors only & MYS majors with Finance concentration.

FINC 413  CAPSTONE: ADVANCED CORPORATE FINANCE  3
This capstone seminar course studies three different intersections of topics in global corporate finance: the intersections of a) currency and interest rate risk management, b) capital raising and securities market trading, and c) strategy and international financial management. The course emphasizes reports, exercises, cases, discussions, presentations, and analysis of financial news.
PREREQ: FINC311, FINC312, FINC314. RESTRICTIONS: Open to Junior and Senior Finance Majors & MYS Majors with Finance concentrations only.

FINC 414  BANK MANAGEMENT  3
Examines the management of commercial banks and similar institutions. Topics include funds and capital management, liquidity and credit standards, and lending and trust operations.
PREREQ: FINC412. RESTRICTIONS: Open to Junior and Senior Finance majors & MYS Majors with Finance concentrations only.

FINC 415  INTERNATIONAL FINANCE  3
Examines the international monetary environment and its impact on financial planning for the firm. Topics include exchange rates, currency restrictions, tax regulations, direct investment theory, capital budgeting, financing, risk management, and working capital management.
PREREQ: FINC311 and ECON308. RESTRICTIONS: Open to Junior and Senior Finance Majors only and MYS majors with Finance concentration.

FINC 416  DERIVATIVE SECURITIES AND RISK MANAGEMENT  3
Examines the trading, valuation and theory of pricing futures and forward contracts, options, swaps and other derivative securities. Emphasis is placed on the use of derivatives for hedging and risk management. 
PREREQ: FINC314 and MATH230. RESTRICTIONS: Open to Junior and Senior Finance Majors and MYS Majors with Finance concentrations only.

FINC 417  REAL ESTATE FINANCE  3
Introduces real estate theory and management. Topics include financing, evaluation and property management, housing policy, and governmental regulation and participation.
PREREQ: FINC314.

FINC 418  SEMINAR IN CORPORATE GOVERNANCE  3
Examines current issues in corporate governance. Topics include executive compensation, shareholder resolutions and board of director ownership and accountability.
PREREQ: FINC311. RESTRICTIONS: Open to Junior and Senior Finance Majors only.

FINC 419  FINANCIAL MODELING AND VALUATION  3
Applies economic principles and financial modeling techniques to value seasoned equity initial public offerings, mergers, private equity transactions, and leveraged buyouts.
PREREQ: FINC312 and FINC314. RESTRICTIONS: Open to Junior and Senior Finance majors and MYS Majors with Finance concentrations only.

FINC 420  MEET THE MARKET  1
Prepares students intending to pursue careers in finance markets about the latest innovations in the practice of trading and corporate finance primarily consist of seminars delivered by leading finance professionals.
RESTRICTIONS: Open to FINC, ECON, and ACCT seniors, MSF students, MBA students, ECON Master and PhD students, and any student interested in pursuing a career in Finance only.

FINC 425  FINANCIAL PLAN DEVELOPMENT  3
The capstone experience engages students in critical thinking and decision making about personal financial management topics, integrating the knowledge gained in previous courses into a cohesive, inclusive understanding of the financial planning process. A key component of this module will be to develop a comprehensive financial plan.
PREREQ: FINC320, FINC321, FINC322, ACC413, and ACC414. RESTRICTIONS: Open to Senior Financial Planning Majors only.

FINC 459  STARTUP FINANCE & RASING CAPITAL FOR ENTREPRENEURS  3
Examines the sources of capital for new and growing companies with a special emphasis on angel investment, venture capital, private equity, and non-dilutive and other niche options; the management of cash flows; uses of capital; and financial statement presentation and analysis (a cornerstone of valuation, lending/borrowing, and investing). Case examples and live projects are emphasized to provide students with firsthand experience in financial decision making for startup and emerging growth businesses. May be crosslisted with ENTR459.

FINC 466  INDEPENDENT STUDY  1-6

FINC 620  MEET THE MARKET  0
Prepares students intending to pursue careers in finance markets about the latest innovations in the practice of finance. Course primarily consist of seminars delivered by leading finance professionals.
RESTRICTIONS: Open to FINC, ECON, and ACCT seniors, MSF students, MBA students, ECON Master and PhD students, and any student interested in pursuing a career in Finance.
FINC 659 STARTUP FINANCE & Raising Capital for Entrepreneurs 3
Examines the sources of capital for new and growing companies with a special emphasis on angel investment, venture capital, private equity, and non-dilutive and other niche options; the management of cash flows; uses of capital; and financial statement presentation and analysis (a cornerstone of valuation, lending/borrowing, and investing). Case examples and live projects are emphasized to provide students with firsthand experience in financial decision making for startup and emerging growth businesses. May be crosslisted with ENTR659.

FINC 841 FINANCIAL SERVICES MARKETS 3
Focuses on the economic roles and interactions of the units in each sector of the financial services industry. Overview of the current and changing layout of institutions, products, and practices. May be crosslisted with FSAN841.

FINC 842 FINANCIAL SERVICES RISK ANALYTICS 3
Develops the theoretical and practical foundations of resource allocation across time and risky assets, and of credit risk and systemic considerations. Topics include allocation of resources across time; allocation of resources across risks and credit risk and systemic considerations. May be crosslisted with FSAN842.

FINC 843 FINANCIAL SERVICES REGULATION 3
Examines the regulatory environment of financial services industry, including policy choices, goals and costs/benefits. We will consider how companies and individuals, using people, processes and technology, meet their ethics, compliance and control objectives in a global environment. May be crosslisted with FSAN843.

FINC 850 FINANCIAL MANAGEMENT 3
Provides an introduction to the fundamental concepts of the finance function with an emphasis on the decision-making techniques relevant to financial and nonfinancial managers. Topics include valuation, risk and return, capital budgeting, cost of capital, financial analysis and planning, and working capital management. PREREQ: ACCT800.

FINC 851 CORPORATE FINANCIAL ANALYSIS 3
Examines major policy-making areas in corporate finance and the impact of alternative policies on the value of the firm. Emphasis is placed on strengthening financial decision-making skills. Advanced topics include capital investment policy, financing and capital structure policies, dividend policy, and corporate control. PREREQ: FINC850.

FINC 852 INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT 3
Examines the role and functioning of securities markets, valuation techniques, and the theory and practice of portfolio management. Topics include portfolio construction and evaluation metrics, relative valuation techniques and an introduction to derivative security pricing. PREREQ: FINC850.

FINC 853 INTERNATIONAL FINANCIAL MANAGEMENT 3
Examines the financial management of multinational firms and the interrelationships between financial planning and the international economic environment. Topics include direct investment theory, capital budgeting, financing trade and investments, risk management and working capital management. PREREQ: FINC850.

FINC 854 SPECIAL TOPICS IN FINANCE 1-3
Examines selected topics of current interest in various areas of finance, including corporate financial management, investment analysis and portfolio management, or financial institutions and markets. PREREQ: FINC850.

FINC 855 CAPITAL MARKETS & FINANCIAL INSTITUTIONS 3
Examines various types of financial institutions. Topics include structure, performance, asset/liability management, regulation and current issues that impact operational structures. PREREQ: FINC850.

FINC 856 FINANCIAL ENGINEERING AND RISK MANAGEMENT 3
Introduces the pricing, trading and use of derivative securities (futures, futures, swaps and options contracts), emphasizing the management of risk arising from the volatility of exchange rates, interest rates and commodity and equity prices. PREREQ: FINC850.

FINC 857 PRIVATE EQUITY & VENTURE FINANCE 3
Understanding of economic role of private equity and venture capital, the structure of the industry, and the forces that shape its development. Develop analytical deal-structuring techniques, interact with private equity professionals, and learn about unique risks of private equity investing. May be crosslisted with ACCT857. PREREQ: ACCT800 and FINC850 or equivalent.

FINC 858 CORPORATE GOVERNANCE 3
Introduces issues pertaining to corporate governance and oversight, and examines topics of current interest concerning the relationships between corporate boards, company management, and shareholders. PREREQ: FINC850.

FINC 859 SEMINAR IN FINANCE 3
Emphasis is on financial research and the application of alternative research methods to a project or current interest. Involves individual inquiry, written communication of results, and presentation of findings by each student. PREREQ: FINC850. RESTRICTIONS: Requires 24 M.B.A. credit hours.

FINC 861 FINANCIAL MODELLING AND VALUATION 3
Financial modeling techniques to value IPOs, mergers, private equity transactions, and leveraged buyouts. Explore the economic principles supporting these techniques and apply them to various transaction types using real financial data. Focus is on bridging the gap between theory and practice. PREREQ: FINC850.

FINC 862 FIXED INCOME SECURITIES 3
An overview of the fixed income markets and instruments within those markets. Focus is on valuation and analysis of fixed income instruments and the roles of different participants within the fixed income markets. PREREQ: FINC850.

FINC 866 SPECIAL PROBLEM 1-12

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

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

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

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

FREN 107 FRENCH III - INTERMEDIATE 4
Review of grammar, continued practice in speaking and writing, and reading texts of average difficulty. PREREQ: FREN106 RESTRICTIONS: Four years of high school French acceptable in lieu of prerequisite. Satisfies College of Arts and Sciences language requirement.
FREN 111 INTERMEDIATE FRENCH I
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
Continued practice in speaking and writing, reading texts of average difficulty. Grammar review as needed. PREREQ: FREN111. RESTRICTIONS: Four years of high school French acceptable in lieu of prerequisite. Satisfies Arts and Sciences foreign language requirement.

FREN 200 GRAMMAR AND COMPOSITION
Intensive grammar review of all major verb tenses and grammatical concepts (such as object pronouns). Emphasis is on grammar improvement through reading and writing. PREREQ: FREN107 or FREN112

FREN 205 FRENCH CONVERSATION
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. Not intended for native speakers of French.

FREN 206 CULTURE THROUGH CONVERSATION
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 French.

FREN 207 FRENCH CARIBBEAN PAST AND PRESENT
Introduction to contemporary French Caribbean, its history, its culture, its people, their way of life and the issues confronting them. Focuses on Martinique. RESTRICTIONS: Taught in English during Winter Session abroad. Not for minor credit.

FREN 208 CONTEMPORARY FRANCE I
An introduction to contemporary France, its culture, its people, their way of life and the issues confronting them. RESTRICTIONS: Not for major credit. Taught abroad only, in both English and French. Does not satisfy the foreign language requirement.

FREN 209 FRENCH CONVERSATION THROUGH FILM
Development of oral proficiency in French through discussion and analysis of major French films. Some written work and grammar review where appropriate. PREREQ: FREN107 or FREN112 or one 200-level French course. RESTRICTIONS: Minimum grade of B required for prerequisites.

FREN 210 FRENCH CANADA PAST AND PRESENT
Examines the historical, economic, political, cultural, and literary evolution of Canada's Francophone province (1608 to the present). Explores strategies to preserve its unique cultural heritage including referenda on sovereignty and Law 101. Follows its transition from a post-Conquest, isolated region to an engaged player in global markets. COREQ: FREN107 or FREN206. RESTRICTIONS: Taught abroad in French and English. Not for minor credit. Satisfies the following requirements: Arts and Sciences' Group B.

FREN 211 FRENCH READING AND COMPOSITION
Reading and discussion of French literature. Frequent compositions. Grammar review where appropriate. PREREQ: FREN200 with a minimum grade of C or FREN107 with a minimum grade of A- or FREN112 with a minimum grade of A.

FREN 250 INTRODUCTION TO BUSINESS FRENCH
Familiarizes students with characteristics of business French (terminology, syntactical patterns, etc.) and policies and practices of the French business community. PREREQ: Any 200-level course taught in the French language.

FREN 301 INTRODUCTION TO FRENCH LITERATURE: PROSE
Selected readings, with discussion and analysis, of the various genres of prose fiction (contes, nouvelles, romans) and nonfiction (essais) from the middle ages to the present. PREREQ: FREN211 and any 200-level course taught in the French language.

FREN 302 INTRODUCTION TO FRENCH LITERATURE: POETRY AND THEATRE
Selected readings, with discussion and analysis, of the various genres of poetry (lyrical, epic, narrative) and theatre (comedy, tragedy, drama) from the middle ages to the present. PREREQ: FREN211 and any 200-level course taught in the French language.

FREN 305 FRENCH CONVERSATION AND COMPOSITION
Discussion of cultural, social and political topics in French-speaking countries. Vocabulary building, grammar exercises and compositions. PREREQ: FREN211 and one other 200-level FREN course taught in French. RESTRICTIONS: Not intended for native speakers of French.

FREN 306 PRACTICAL ORAL/Written Expression
Strengthens grammar and vocabulary skills in preparation for advanced courses. Class exercises include oral exposures, discussion of articles and videos, textual analysis and compositions. PREREQ: Any two 200-level French courses conducted in French. RESTRICTIONS: Taught abroad only.

FREN 307 PRACTICAL ORAL EXPRESSION
Strengthens grammar and vocabulary skills in preparation for advanced courses, as well as everyday oral communication situations. Class exercises include oral exposures, skits, discussion of articles and videos. PREREQ: Any two 200-level FREN courses conducted in French. RESTRICTIONS: Taught abroad only.

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

FREN 309 PRACTICAL WRITTEN EXPRESSION
Strengthens grammar and vocabulary skills through regular writing practice. Class exercises include compositions, analysis of literary texts, and study of authentic documents. PREREQ: FREN211 and any other 200-level FREN course taught in French. RESTRICTIONS: Taught abroad only.

FREN 314 FRENCH PHONETICS
Studies the sounds of the French language (both individual phonemes and items of connected speech, such as liaison, linking, intonation, etc.). Helps improve pronunciation of the language. PREREQ: Any two 200-level French courses RESTRICTIONS: Not intended for native speakers of French.

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

FREN 326 FRENCH CIVILIZATION II
A study of French cultural history from the French Revolution to 1945. PREREQ: Any two 200-level French courses.

FREN 350 ADVANCED BUSINESS FRENCH
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:
Explores an area of special interest in French literature or culture studies.

FREN 366 INDEPENDENT STUDY
1-3

FREN 403 STRUCTURE OF FRENCH
Study of the sounds, morphology and syntax of the French language, as well as of discursive phenomena. Introduces students to the science of linguistics as applied to French. Taught in French. PREREQ: Two 300-level French courses, one of which should be FREN314.

FREN 404 ADVANCED COMPOSITION AND GRAMMAR
Intensive writing practice in French (seven compositions, all to be revised), with systematic grammar review: past tenses, articles, adjectives, participle, passive voice, the conditional, the subjunctive, concordance of verb tenses, demonstrative pronouns. PREREQ: Two 300-level French courses.

FREN 405 TRANSLATION AND STYLISTICS
Focuses on vocabulary and translation skills (from French into English and vice-versa). PREREQ: Two 300-level French courses with a minimum grade of B+.

FREN 406 ADVANCED FRENCH LANGUAGE
Grammatical structure and stylistics with special attention given to technical vocabulary and discourse. PREREQ: Any 300-level French course. RESTRICTIONS: Course taught abroad only.
FREN 407 ADVANCED ORAL FRENCH 3
Varied activities help students develop their oral expression and comprehension and gain confidence in oral communication situations. Class exercises include oral exposure, skits, discussion of articles and videos.
RESTRICTIONS: Only taught abroad.

FREN 408 ADVANCED WRITTEN FRENCH 3
Strengthens grammar and vocabulary skills through regular writing practice. Class exercises include compositions, analysis of literary texts, and study of authentic documents. Study of grammar and stylistics, with special attention given to technical vocabulary and discourse.
RESTRICTIONS: Taught abroad only.

FREN 411 GREAT AUTHORS I: 1100-1750 3
Selected readings of master authors and works from the Middle Ages to the Age of Enlightenment. Authors may include Villon, Rabelais, Montaigne, Moliere, Corneille, Mme. de Lafayette, Montesquieu, Voltaire and others.
PREREQ: Any two 300-level French literature courses

FREN 412 GREAT AUTHORS II: 1750-PRESENT 3
Selected readings of master authors and works from the dawn of Romanticism to the present. Authors may include Prevost, Rousseau, Hugo, Flaubert, Baudelaire, Gide, Proust, Camus, Sartre, Ionesco, Beckett, Duras and others.
PREREQ: Any two 300-level French literature courses

FREN 423 FRENCH MEDIEVAL LITERATURE 3
Survey of French literature to 1500. 
PREREQ: Any two 300-level French literature courses

FREN 424 FRENCH RENAISSANCE LITERATURE 3
Selected works by Rabelais, the poets of the Pleiade, Montaigne and others.
PREREQ: Any two 300-level French literature courses

FREN 437 SEVENTEENTH CENTURY FRENCH THEATRE 3
Growth of French dramatic literature before 1715 and analysis of the principal plays of Corneille, Racine and Moliere.
PREREQ: Any two 300-level French literature courses

FREN 438 SEVENTEENTH CENTURY FRENCH POETRY AND PROSE 3
Representative novelists, poets, critics and moralists from Descartes and Pascal to La Fontaine, Boileau, Mme. de La Fayette and others.
PREREQ: Any two 300-level French literature courses

FREN 441 THE EIGHTEENTH CENTURY: THE AGE OF VOLTAIRE 3
Novels, plays, essays and poetry of such authors as Montesquieu, Marivaux, Prevost and Voltaire.
PREREQ: Any two 300-level French literature courses

FREN 442 THE EIGHTEENTH CENTURY: THE AGE OF ROUSSEAU 3
Novels, plays, essays and poetry of such authors as Diderot, Rousseau, Beaumarchais and 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 two 300-level French literature courses.

FREN 446 NINETEENTH CENTURY FRENCH POETRY AND THEATRE 3
Poets and dramatists representative of Romanticism, Realism and the Symbolist movement.
PREREQ: Any two 300-level French literature courses.

FREN 451 TWENTIETH CENTURY FRENCH LITERATURE: THE AGE OF ANXIETY AND THE ABSURD 3
Main trends from Gide, Celine and Malraux to Camus, Sartre and Beckett, including Surrealism, Existentialism and the Theatre of the Absurd.
PREREQ: Any two 300-level French literature courses.

FREN 452 ASPECTS OF CONTEMPORARY FRENCH LITERATURE 3
A study of contemporary French literature, including novels, plays, essays and poetry of such authors as Robbe-Grillet, Sarrutte, Perec, Tournier, Duras, Ponge, Bonnefoy, Jaccottet and Barthes.
PREREQ: Any two 300-level French literature courses.

FREN 453 CONTEMPORARY FRENCH CIVILIZATION: 1958-PRESENT 3
Culture, customs and political and economic life in France since 1958.
PREREQ: Any two 300-level French courses.

FREN 454 FRENCH CINEMA 3
Study of modern French cultural history through the films of such masters as Vigo, Gance, Pagnol, Renoir, Bresson, Resnais, Malle and others.
PREREQ: Any two 300-level French literature courses.

FREN 455 SELECTED AUTHORS, WORKS AND THEMES 3-12
Works of one or more outstanding authors or on a special theme.
PREREQ: Any two 300-level French literature courses. RESTRICTIONS: May be repeated for credit when topics vary.

FREN 456 FRENCH THEATER WORKSHOP 3
Study of French theater of different periods and genres, with an emphasis on staging and performance. Class activities include dramatic readings, improvisation, and exercises to improve diction. Culminates in a public presentation of students' work.
PREREQ: Any two 300-level French literature courses.

FREN 457 THE FRANCOPHONE WORLD 3
Examines the social, cultural, political and historical aspects of various regions of the Francophone world (the Maghreb, Sub-Saharan Africa, the Caribbean, South East Asia (Vietnam) and Lebanon) as well as the Beur (descendants of the first generation of Magrebi immigrants) phenomenon in the French banlieue (suburbs). Texts and films serve as points of entry into these multicultural communities.
PREREQ: Any two 300-level French courses.

FREN 458 FRANCOPHONE AFRICAN CINEMA 3
The cinemas of Francophone Africa from the 1960s to the present. Analysis of how African filmmakers have challenged and refocused prior and degrading images by creating new depictions of their societies, and offering Africa through African eyes. Exploration of the social, historical, and political contexts of these films as well as examination of each of them closely to better understand their aesthetic and narrative characteristics. Appreciation of local frameworks of knowledge and of recent theoretical developments in film studies.
PREREQ: Any two 300-level French literature courses.

FREN 459 NÉGRITUDE, ANTILIANITE, CREOLITE 3
Focuses on the literary movements of Négritude, Antillanite, and Créolite, and their relation to Caribbean identity, culture and history, as well as to the field of Francophone postcolonial studies.
PREREQ: Any two 300-level French literature courses.

FREN 460 LITTÉRATURE FRANCOPHONE ISSUE DE L’IMMIGRATION 3
Introduction to literary productions by African, Caribbean and Asian immigrants in France. Acquire a understanding of relevant strands of current theoretical thinking through close analysis of texts. Examine recurrent themes and forms in immigrant literature, including: representation of identity; concepts of origins; intersection of race, class and gender; and textual strategies underpinning these considerations. Examine different ways these authors are redefining French literature.
PREREQ: Any two 300 level French literature courses.

FREN 466 INDEPENDENT STUDY 1-3

FREN 533 FRENCH READINGS FOR PH.D. CANDIDATES 3 PF
A basic course with emphasis on developing reading comprehension.

FREN 605 TRANSLATION AND STYLISTICS 3
Focuses on vocabulary and translation skills (from French into English and vice versa). Literary, commercial and journalistic texts serve as stylistic models.

FREN 611 GREAT FRENCH AUTHORS I: 1100-1750 3
Selected readings of master authors and works from the Middle Ages to the Age of Enlightenment. Authors may include Villon, Rabelais, Montaigne, Moliere, Corneille, Mme. de Lafayette, Montesquieu, Voltaire and others.

FREN 612 GREAT FRENCH AUTHORS II: 1750-PRESENT 3
Selected readings of master authors and works from the dawn of Romanticism to the present. Authors may include Prevost, Rousseau, Hugo, Flaubert, Baudelaire, Gide, Proust, Camus, Sartre, Ionesco, Beckett, Duras and others.

FREN 623 FRENCH MEDIEVAL LITERATURE 3
Survey of French literature to 1500.

FREN 624 FRENCH RENAISSANCE LITERATURE 3
Selected works by Rabelais, the poets of the Pleiade, Montaigne and others.

FREN 637 SEVENTEENTH CENTURY FRENCH THEATRE 3
Growth of French dramatic literature before 1715 and analysis of the principal plays of Corneille, Racine and Moliere.
FREN 638  SEVENTEENTH CENTURY FRENCH POETRY AND PROSE  3
Representative novelists, poets, critics and moralists from Descartes and Pascal to La Fontaine, Boileau, Mme. de La Fayette and others.

FREN 641  THE EIGHTEENTH CENTURY: THE AGE OF VOLTAIRE  3
Novels, plays, essays and poetry of such authors as Montesquieu, Marivaux, Prevost and Voltaire.

FREN 642  THE EIGHTEENTH CENTURY: THE AGE OF ROUSSEAU  3
Novels, plays, essays and poetry of such authors as Diderot, Rousseau, Beaumarchais and 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, Céline and Malraux to Camus and Beckett, including Surrealism, Existentialism and the Theater 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, Perec, Tournier, Duras, Ponge, Bonnefoy, Jaccottet and Barthes.

FREN 655  SELECTED AUTHORS, WORKS AND THEMES  3-12
Works of one or more outstanding authors or on a special theme. RESTRICTIONS: May be repeated for credit when topics vary.

FREN 658  TOPICS IN FRANCOPHONE LITERATURE  3
Varying aspects of Francophone studies, such as women’s writing, literature of Quebec, colonial literature, African literature and cinema, literature of immigration.

FREN 659  NEGRITUDE, ANTILLANITE, CREOLOTE  3
Focuses on the literary movements of Negritude, Antillanite, and Creolite, and their relation to Caribbean identity, culture and history, as well as to the field of Francophone postcolonial studies.

FREN 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. Emphasizes preparation of seminar presentations and term paper. RESTRICTIONS: May be repeated for credit when topics vary.

FINANCIAL SERVICES ANALYTICS

FSAN 815  ANALYTICS I: STATISTICAL LEARNING  3

FSAN 817  LARGE SCALE MACHINE LEARNING  3
Introduction to the analysis and processing of massive high-dimensional data. Massive data sets generally involve growth not only in the number of individuals represented but also in the number of descriptive parameters of the individuals, leading to exponential growth in the number of hypothesis considered. New approaches to address these problems exploit sparsity prior concepts from optimization theory, signal processing, statistics, and machine learning. Crosslisted with ELEG817. PREREQ: ELEG815.

FSAN 820  FOUNDATION OF OPTIMIZATION  3
Concept of optimization, convex set, convex function, unconstrained optimization, convex optimization problems, including least-squares, linear, and quadratic optimization, duality theory, sensitivity analysis. Modeling of more advanced optimization techniques including integer programming, geometric and semi-definite programming, and convex relaxations. PREREQ: First course on linear algebra and calculus.

FSAN 830  BUSINESS PROCESS MANAGEMENT INNOV  3
Employ a data-driven approach to designing, managing, and improving the business processes that execute a firm’s strategy. Exploring the linkage between strategy and business process design and quickly moves into identifying key process metrics which have greatest leverage on improving performance at both the process and firm-wide levels. Planning and controlling for variability in business processes is discussed with applications drawn from diverse settings. Become proficient in improving processes based on leveraging data and learning to deploy resources and information to achieve consistently good outcomes.

FSAN 831  ENTERPRISE INFORMATION SYSTEMS  3
Focus on the various technologies and implementation issues of enterprise information system (EIS). Students will learn the critical role of EIS in business organizations, the interplay between business processes and EIS, how to use and configure an EIS, and the best practices in managing an EIS. (Primary designation MIS; secondary designation FSAN. Crosslisted with MISY831.

FSAN 841  FINANCIAL SERVICES MARKETS  3
Focuses on the economic roles and interactions of the units in each sector of the financial services industry. Overview of the current and changing layout of institutions, products, and practices. Crosslisted with FINC841.

FSAN 842  FINANCIAL SERVICES RISK ANALYTICS  3
Develops the theoretical and practical foundations of resource allocation across time and risky assets, and of credit risk and systemic considerations. Topics include allocation of resources across time; allocation of resources across risks and credit risk and systemic considerations. Crosslisted with FINC842.

FSAN 843  FINANCIAL SERVICES REGULATION  3
Examines the regulatory environment of financial services industry, including policy choices, goals and costs/benefits. We will consider how companies and individuals, using people, processes and technology, meet their ethics, compliance and control objectives in a global environment. Crosslisted with FINC843.

FSAN 850  FINANCIAL SERVICES ANALYTICS SEMINAR  3
Concentrated study on selected areas in Financial Services Analytics. May be crosslisted with CISC850. RESTRICTIONS: 6 credits of this class is required in the Financial Services Analytics PhD program.

FSAN 860  CURRENT RESEARCH TOPICS  1-9 PF
Upper-level graduate research oriented toward the student’s potential Doctoral Dissertation.

FSAN 969  DOCTORAL DISSERTATION  9 PF
Independent dissertation research after completion of applicable coursework and examinations.

GEOF 101  PHYSICAL GEOGRAPHY  3
Our Earth’s physical geography derives from dynamic interactions among the four environmental spheres - the atmosphere (air), hydrosphere (water), biosphere (life), and landforms (rocks and soils). Explores the physical elements of our environment, the processes involved in their development, their distribution, and their interrelationships. Natural processes and modification by humans serve as the central focus, as well as the emphasizing the specialized geographic tools used to study our environment.

GEOF 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.

GEOF 103  TOPICS IN HUMAN-ENVIRONMENT  3
Explores the nature of human-environment interactions and examines how nature-society interactions evolve and change over time. These interactions are viewed from different cultures and regional perspectives.
GEOG 106  PHYSICAL GEOGRAPHY: LAND SURFACE PROCESSES  3  Introduction to processes responsible for the development, modification, distribution and variety of landforms and soils. Implications for human activities. Analysis of topographic maps and air photo interpretation. Together GEOG101 and 106 form a comprehensive introduction to physical geography and its tools.

GEOG 111  CLIMATIC PROCESSES LABORATORY  1  Laboratory investigation of processes responsible for creating and modifying our dynamic physical environment. Lab offers interpretation of maps, examination of environmental data, understanding the development of landforms, and interpretation of maps and imagery (aerial and satellite).

GEOG 120  WORLD REGIONAL GEOGRAPHY  3  Introduction to the geographic regions of the world and the changing relations between regions. Emphasis is on environmental, economic, and political geographic relationships between industrial and developing nations.

GEOG 152  CLIMATE AND LIFE  4  Introduction to those physical and biological processes that shape our climatic environment. Important themes include the exchanges of energy and mass between the atmosphere and both vegetation and built environments; and the influence of climate on humans and humans on climate.

GEOG 166  SPECIAL PROBLEM  1-3

GEOG 203  INTRODUCTION TO CULTURAL GEOGRAPHY  3  Introductory study of people, landscapes and cultures through time. Emphasis is on culture, ethics and aesthetics as contexts for human perceptions and the creation of varied human habitats.

GEOG 215  FULL OF HOT AIR UNDERSTAND CLIMATE CHG  3  Understanding climate and climate change is important for everyone. Explores climate change and its impacts at local, regional, and global levels. Policy and decision making, as well as adaptation and mitigation will be discussed with a focus on current events. Crosslisted with MAST215.

GEOG 220  METEOROLOGY  3  Analysis of the atmosphere, weather elements, air masses, fronts and storms. Principles of weather forecasting, especially as it relates to severe weather.

GEOG 221  METEOROLOGY LAB  1  Meteorology lab will introduce students to basic concepts in meteorology through the completion of experiments and mapping analysis exercises. COREQ: GEOG220.

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 228  GEOGRAPHY OF CHINA  3  Introduces the physical, economic, cultural and political geography of China. Particular emphasis is placed on the diversity of physical environments, cultures, and economic activity within China.

GEOG 230  HUMAN IMPACT ON THE ENVIRONMENT  3  Provides an introduction to the past, present, and future impacts of humans on Earth. Topics include anthropogenic impacts on vegetation, animals, soils, water, landforms, and the atmosphere, and possible future impacts as a result of global change. Particular attention is paid to the interconnections among environmental systems and the influence of human activities.

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  Interdisciplinary introduction to individual and group behavior in relation to developed and natural environments. The implications of such human environment interactions for planning.

GEOG 250  COMPUTER METHODS FOR GEOGRAPHIC AND ENVIRONMENTAL SCIENCES  4  Modern Fortran programming for application to data analysis and modeling, with examples and applications from the geographical and environmental sciences. Topics include the basics of data reduction, numerical modeling, and design and use of scientific graphics.

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 260  DIGITAL GEOGRAPHY  1  Introduction to media technology and digital storytelling techniques. Will learn how to communicate geographic information important to environmental and social problems. Emphasis is on hands-on multimedia production.

GEOG 271  INTRODUCTION TO GEOGRAPHIC DATA ANALYSIS  3  A survey of computational, statistical, and graphical techniques used in scientific data analysis with particular emphasis on the special nature of geographic and spatial data. Includes scripting language programming.

GEOG 300  RESEARCH DESIGN AND MIXED METHODS  3  Explores the fundamental connections between geographic inquiry and methods used when conducting research and data analysis in human geography.

GEOG 309  GEOGRAPHY OF CENTRAL AND WESTERN EUROPE  3  Environments, cultures, utilization of resources, problems of development and future opportunities in central and western European countries. Field trips to see geographic features (alpine landscapes) specific to Austria.

GEOG 310  SOCIAL GEOGRAPHY  3  Some of the socio-economic, political, historical and cultural factors that have created and reinforced distinctively separate spaces for diverse groups of people in the United States are examined. Using films, novels, academic articles, media accounts, and census information about their own hometowns, students will examine attitudes and actions that socially and spatially relegate ethnic and socio-economic minorities to less-than-privileged places. Besides looking at the role of race/ethnicity in the creation of a distinctively American social geography we will address how religion, class, gender, and generational differences shape the ways that people imagine, design, regulate, defend and give meaning to the spaces that they inhabit. RESTRICTIONS: Not open to first year students.

GEOG 311  ECONOMIC GEOGRAPHY & UNEVEN DEVELOPMENT  3  Examines the geographies (territory, location, place, scale, culture) of large- and small-scale economic processes and human practices. Considers the historical and contemporary factors that shape the current spatial economic order and diverse economies.

GEOG 315  PEOPLE, POLITICAL AND PLACE  3  Course readings and off-campus fieldwork in this applied geography DLE course will address geopolitical issues faced by real people in real places. Topics and nearby fieldwork locations vary by semester, depending on community partnerships and project parameters set up by the instructor ahead of time. RESTRICTIONS: Not intended for freshmen.

GEOG 320  WATER AND SOCIETY  3  Study of the physical occurrence and distribution of water in all parts of the hydrologic cycle: introduces the nature of human demands for water, the possibilities of obtaining additional supplies and the difficult legal, economic and political questions of management of water resources.

GEOG 325  URBAN GEOGRAPHY  3  Spatial relationships of urban areas, focusing on the structure of towns, the organization of urban space and the external relationships of cities.

GEOG 329  INTERNATIONAL MIGRATION  3  Interdisciplinary introduction to alternative/complementary disciplinary approaches to the study of human movement between states. Offered on a rotational basis by faculty involved in the University of Delaware migration group. Crosslisted with POCS29.
GEOG 341  CLIMATE AND CLIMATE CHANGE  3
Understanding the earth's climate and how the climate is changing is a fundamental part of modern earth system science. Explores the scientific basis for the study of climate and climate change, including long term and modern change, with a discussion of current topics. May be crosslisted with GEO341, MAST341.

GEOG 342  BIOCLIMATOLOGY  3
Biosphere-ocean interactions and corresponding feedbacks are examined in detail. Emphasis also is placed on the influences of weather and climate on plants, animals, and humans.

GEOG 345  CULTURAL GEOGRAPHY  3
Broad principles of the field. Human mobility and stasis. Material and symbolic landscapes. Individual and group values in landscape formation and change.

GEOG 346  URBAN CULTURAL GEOGRAPHY  3
City landscapes as expressions of attitudes and ideals. Oriental and Western; classical, modern and future. Humanizing the urban landscape.

GEOG 351  FIELD METHODS IN METEOROLOGY  3
Sampling, instrumentation, measurement, analysis, and interpretation of data concerning properties and processes of the atmospheric environment. Use of field and laboratory equipment within the context of research and monitoring projects. Practical application of climatological and meteorological principles. Exploration of quality control methods and database techniques.

GEOG 360  DIGITAL GEOGRAPHY II  3
Builds on GEOG260 - Digital Geography I and introduces students to additional media technology and storytelling techniques. Other concurrent courses may be considered with permission of Instructor. External hard drive formatted for MAC required.
PREREQ: GEOG260. COREQ: GEOG315 or GEOG372, or permission of instructor.

GEOG 366  INDEPENDENT STUDY  1-6
GEOG 372  INTRODUCTION TO GIS  3
Fundamental geographic concepts and principles necessary to effectively use GIS to examine geographic problems. Hands-on training is provided in the use of professional GIS software in the context of collecting, managing, processing, analysis and presenting geographic data. Emphasis is placed on the nature of spatial data, modeling techniques, spatial analysis and cartographic design.

GEOG 390  HONORS COLLOQUIUM  1
GEOG 405  COMPUTING FOR ENVIRONMENTAL RESEARCH  2
Using a mixture of guided self-study and lecture, students learn modern Fortran programming for application to environmental data analysis and atmospheric and geological modeling. Older language features and use of legacy codes are also covered lightly.

GEOG 408  HEAT AND LIGHT IN NATURE - RADIATIVE TRANSFER  3
The energetic interaction of sunlight with the atmosphere and oceans influences the entire earth system. Examines the theory of radiative transfer within the ocean and atmosphere, and then explores several areas of applicable research including climate modeling and remote sensing.
Crosslisted with MAST408.

GEOG 409  THE OCEAN & CLIMATE VARIATION  3
Study of the ocean-atmosphere system; the fluxes of heat, water and energy in the ocean and interchanges with the atmosphere; budgets and mechanisms of exchange; and interannual and long-term climate variations related to the ocean. This course satisfies the second writing requirement in the College of Earth, Ocean, and Environment.
Crosslisted with MAST409.

GEOG 411  FLUVIAL GEOMORPHOLOGY  3
Crosslisted with GEOL411. PREREQ: GEOL107 or permission of the instructor.

GEOG 412  PHYSICAL CLIMATOLOGY  4
Investigates the nature of the Earth's climate by examining the physical processes that maintain our climate system. Focuses primarily on the flow of energy and moisture in the global climate and its geographic variation on scales of hundreds to thousands of kilometers. Human-induced modifications to the climate system, such as urbanization, anthropogenic global warming, desertification, and tropical deforestation, are also discussed. The lab portion of the class teaches descriptive, analytical, programming and mapping skills to model our climate system and to illustrate the analyses of climate datasets.
PREREQ: MATH241 and GEOG220.

GEOG 413  METEOROLOGICAL PROCESSES FOR WIND ENERGY  3
Explores the fundamental concepts of meteorology that are needed to understand onshore, offshore, and airborne wind energy. Topics include: forces affecting winds; terrain and land-use effects; air turbulence; numerical modeling; wind power and energy from turbines; and wind measurement technologies.
Crosslisted with MAST413. PREREQ: MATH241, MATH242, and MATH243 or GEOG220; PHYS201 or PHYS207.

GEOG 415  METEOROLOGIC PROCESSES IN AIR POLLUTION  3
An introduction to meteorological processes that affect air pollution, such as diffusion, atmospheric stability, and turbulence, with a focus on the atmospheric boundary layer.
Crosslisted with MAST415. PREREQ: MATH241 and MATH242; CHEM104, CHEM108 or CHEM112; PHYS201 or PHYS207.

GEOG 417  SEMINAR IN CLIMATE CHANGE  3
Examines facts and fallacies regarding global warming and climate science and assesses the current state of scientific understanding of and ability to forecast climate change.
PREREQ: GEOG101 or GEOG152 or GEOG220 or equivalent.

GEOG 420  ATMOSPHERIC PHYSICS AND THERMODYNAMICS  3
Introduction to composition and structure of the atmosphere. Includes atmospheric thermodynamics through introductory cloud physics.
PREREQ: GEOG220 and MATH241.

GEOG 421  PHYSICAL METEOROLOGY  3
Physics and thermodynamics of cloud particles and precipitation. Includes cloud droplet growth, aggregation, precipitation, ice crystal formation, atmospheric electricity, optics, cloud-radiation interactions, acoustics and weather radar.
PREREQ: MATH242.

GEOG 422  RESOURCES, DEVELOPMENT AND THE ENVIRONMENT  3
Focuses on food, resources, energy and population issues in relationship to economic development and the global environment. The main objective is to engage students in discussion and debate on sustainable development policies.

GEOG 423  ATMOSPHERIC DYNAMICS  3
Investigates atmospheric motion in a quantitative manner. Expands basic conservation laws to derive the equations of atmospheric motion and to develop the concepts of vorticity and circulation. Discusses atmospheric wave motion and general circulation.
PREREQ: MATH242 and GEOG220. COREQ: MATH243.

GEOG 424  WEATHER FORECASTING  3
Basic concepts behind weather and climate forecasting. Understanding numerical models and how to interpret their output. Application of satellite and radar products into weather forecasting. Involves operational weather forecasting and provides practice in forecasting and surface map analysis.
PREREQ: GEOG220 or GEOG423. RESTRICTIONS: Requires permission of instructor.

GEOG 426  ADVANCED ATMOSPHERIC DYNAMICS  3
Part 2 of Atmospheric Dynamics (GEOG 423/623). Topics include Boussinesq approximation, Vorticity dynamics, Kelvin's circulation theorem; Vorticity equation; Wave theory; Surface and internal gravity waves; and Geophysical fluid dynamics. May be crosslisted with MAST426. PREREQ: MATH243, MATH302, GEOG423.

GEOG 430  FOOD GEOGRAPHIES & FOOD JUSTICE  3
Examination of the historical and contemporary factors shaping the global food system. Studying processes and practices, such as production and consumption, policymaking, activism, commodity exchange; as well as, actors including states, producers and consumers, farmers, workers and policymakers. Consider how production and consumption are framed and discuss the spatial organization of access to food and agricultural resources through digging into issues related to food justice and food sovereignty on local and global scales.
GEOG 431 WATERSHED HYDRO-ECOLOGY 3
Examines key linkages between hydrology and ecosystems processes in natural and human impacted watersheds. Topics include water quantity and quality and material source, transport and fate in terrestrial and aquatic ecosystems, as affected by biotic and abiotic stressors, including changes in land-use and climate.
PREREQ: MATH114 or MATH117; and GEOG432 or GEOG632.

GEOG 432 ENVIRONMENTAL HYDROLOGY 3
Introduction to hydrologic science. Topics include precipitation, snowmelt, evapotranspiration, infiltration, groundwater, runoff, streamflow, water resources management, and hydrologic applications of remote sensing and geographic information systems. Case studies illustrate hydrological response to changes in land-use and climate. Group studies include field measurements and computer simulations.
PREREQ: MATH114 or MATH117.

GEOG 434 PLAN SUSTAINABLE COMMUNITIES & REGIONS 3
Examines theory and methods for planning for more sustainable communities and regions in a global context in the twenty-first century. Sustainable development is defined and theories of sustainable planning presented that meet goals in the areas of environment, economy, and equity (the Three Es). After discussion of issues central to sustainable planning, course looks at tools for sustainable planning and how current land use and regional planning is and can become more oriented to sustainability. The University of Delaware is featured as an example of sustainable planning.
May be crosslisted with UAPP406.

GEOG 438 WORLD CITIES IN COMPARATIVE PERSPECTIVE 3
World city as a new and distinctive geographic urban form in the world economy. Case studies explore common features of internal structure and external relationships of world cities, their growing environmental problems and extent to which these have decoupled from national cultures and economies.

GEOG 445 METHOD AND THEORY IN GEOGRAPHY 3
The nature of geography, its history, methodology and applications in research and societal problems. A pre-professional course.

GEOG 446 POLITICAL ECOLOGY 3
Introduces students to the subfield of Political Ecology within Geography. Political ecology is concerned with the political and economic factors that shape the use of natural resources.

GEOG 449 ENVIRONMENT AND SOCIETY 3
Considers the relationships between environmental and social processes from the theoretical, philosophical and methodological perspectives of geography. Explores the ethical and contextual implications of framing environmental questions and posing solutions. Examines approaches to the geographical analysis of environmental problems.

GEOG 450 GLOBAL AT HOME 3
Impacts of global migration on immigrant-receiving and/or immigrant-sending communities are examined and the experience of home. Perceptions, policies and practices contributing to social-spatial exclusion/inclusion at multiple scales are addressed. Project-based fieldwork enables students to gain first-hand knowledge of the experiences of mobility and adjustment. RESTRICTIONS: for juniors and seniors only.

GEOG 451 MICROCLIMATOLOGY 4
Introduction to instrumentation and techniques involved in microclimatic monitoring and sampling. Students have the unique opportunity to collect field data through a semester long research project. Research results are written to the specifications of a peer-reviewed scientific journal.

GEOG 452 SEMINAR IN CLIMATOLOGY 3
General theoretical and practical considerations of research in climatology. RESTRICTIONS: Requires permission of instructor.

GEOG 453 METEOROLOGICAL ANALYSIS I 3
The collection, visualization and application of meteorological data is emphasized in the context of diagnosing and forecasting atmospheric systems. The interpretation of meteorological observations and numerical models is a major focus of this class.
PREREQ: GEOG220.

GEOG 454 METEOROLOGICAL ANALYSIS II 3
The application of theory and real-time observations in diagnosing present and predicting future weather. Focus is on application of quasi-geostrophic theory and isotropic analysis in weather forecasting. Analysis and interpretation of meteorological observations and numerical models will be emphasized and applied to jet streams, mid-latitude cyclones and fronts.
PREREQ: GEOG453, MATH241.

GEOG 456 HYDROCLIMATOLOGY 3
Study of the hydrologic cycle as it relates to water in the atmosphere and in and on the earth's surface. Hydrologic processes including precipitation, soil moisture, evapotranspiration, runoff and streamflow are examined.
PREREQ: MATH241.

GEOG 457 NUMERICAL WEATHER PREDICTION 3
Introduces students to the basic numerical techniques used in current models to predicting and/or simulating weather. Topics include: conservation equations of the atmosphere (momentum, energy, mass); numerical methods of solution (finite difference schemes, time splitting); boundary and initial conditions; coordinate systems (horizontal, vertical, staggering); parameterization schemes (turbulence, radiation, moist physics); and model application and evaluation. Particular emphasis will be placed on the Weather Research and Forecasting (WRF) model. Students will learn to run the WRF model and use it as a benchmark for testing and applying the techniques learned in class.
May be crosslisted with MAST457. PREREQ: GEOG405, MATH243, MATH302, GEOG423.

GEOG 458 PALEOCSETIC 3
Covers the factors that cause natural variations in Earth's climate on different time scales, focusing on biotic, geologic, and geochemical records. Includes discussion of changing continental configurations, atmospheric greenhouse gas levels, and the Earth-Sun geometry on ocean circulation and climate change.
May be crosslisted with GEOL458, MAST458.

GEOG 459 REGIONAL CLIMATE MODELING: TECH & APPL 3
Global change is impacting an increasing number of sectors in science, engineering and policy, creating a need for high-resolution regional climate data used in impact assessments and mitigation plans. The primary objective of this course is to understand regional climate processes, modeling techniques, and tools for analysis.
PREREQ: GEOG220 and MATH241, or permission of instructor.

GEOG 464 INTERNSHIP IN GEOGRAPHY 1-6
On the job experience in governmental or private planning, consulting, environmental or engineering agencies.

GEOG 466 INDEPENDENT STUDY 1-6

GEOG 468 DIGITAL WORLDS 3
Investigates the ethics, limitations, and implications of how geographic information is gathered, digitized, analyzed, and communicated in the media-enriched and socially-networked world we live in. A digital geography project is completed to examine how digital technologies are transforming knowledge production in the sciences, social sciences and humanities. PREREQ: 9 credit hours of digital geography coursework or permission of instructor.

GEOG 470 COMPUTER CARTOGRAPHY 4
Introduction to cartographic theory and computational methods necessary for drawing maps with the aid of a digital computer.
PREREQ: GEOG250.

GEOG 471 ADVANCED GIS 3
Advanced study of geographic information science and systems (GIS) including more complex spatial data, editing and topology, data encoding, data quality, preprocessing techniques, spatial analysis, cartography and visualization techniques. Hands-on experience using commercial and/or open source GIS package.
PREREQ: GEOG372 or permission of instructor, and MATH114, MATH115, or MATH117.

GEOG 473 SELECT TECHNICAL TOPICS 1-3
Technical skills training focused on a specific aspect of the processing, analysis, modeling, and visualization of geographic data. The course content of each 1-3 credit course will vary to target a specialized technical topic using high end software such as ArcGIS and ENVI.

GEOG 474 INTRODUCTION TO ENVIRONMENTAL REMOTE SENSING 3
Introduces the fundamental characteristics of electromagnetic radiation, energy interactions, sensors, and ways to extract meaningful geophysical information from remote sensing data to solve geographical and environmental problems. Airphoto interpretation, photogrammetry, and digital image processing techniques are described through in-class demonstrations and hands on exercises using a professional grade image processing system.
PREREQ: GEOG271, MATH115 or MATH117.
**GEOG 475 Satellite Climatology** 3
Use of satellite observations to study the climate system. Discussions consider the development of satellite climatology, sensors, platforms and methodologies used to estimate climate variables from radiance measurements. Aspects of climate that are emphasized include cloud climatologies, cloud systems, atmospheric moisture, radiation budget, land-surface conditions.
PREREQ: GEOG412 or GEOG/MAST408, or permission of instructor.

**GEOG 476 GIS Remote Sensing Technical Consultant** 3
Students with prior GIS/remote sensing experience serve as peer consultants for one of the introductory GIS/remote sensing courses (e.g., GEOG372, Frec480). The consultant assists a student team in formulating an assigned project into a logical sequence of analytic steps, develops his/her own solution to the GIS project, and presents a seminar on that project. This course is not strictly software-specific, and may offer consultants exposure to alternative software packages.
RESTRICTIONS: Permission of instructor.

**GEOG 477 Spatial Data Analysis** 3
Special approaches to analysis of data associated with points, lines and areas on the Earth’s surface commonly encountered in environmental sciences. Introduces mapping, graphical and quantitative approaches to analyzing spatial data. Fortran programs developed and used.
PREREQ: GEOG271.

**GEOG 482 Physical Geography of Cold Environments** 3
Survey and analysis of land surface processes in polar and mountain environments. Emphasis on the ground thermal regime, permafrost, periglacial (cold climate, nonglacial) landforms and environmental problems in cold regions. May be crosslisted with GEOG482. PREREQ: GEOG106 or GEOG105/115 or GEOG117.

**GEOG 485 Geomorphology** 3
Survey of natural landforms and the processes that shape them. Topics include landscape evolution, dynamic equilibrium, rates of landform change, and the topographic response to tectonic and climatic forcing. May be crosslisted with GEOG485. PREREQ: GEOG117 or permission of the instructor.

**GEOG 600 Prelude to Geography** 1
Introduction to contemporary American geography, especially its research and educational frontiers. Also emphasizes theoretical and practical considerations in formulating, carrying out and evaluating geographic research. Students additionally are required to attend (and then discuss) the Department’s Friday afternoon guest lectures.
RESTRICTIONS: Open to graduate students in geography and climatology only.

**GEOG 601 Proseminar in Geography I** 2
Examines the contemporary structure of geography, as its theories and approaches to inquiry. Surveys the discipline’s historical development, and introduces bibliographic and electronic literature searches, how to formulate a research question and organize research into that question.
RESTRICTIONS: Open to graduate students in geography and climatology.

**GEOG 602 Proseminar in Geography II** 2
Deepens ability to conduct research into a thesis or dissertation problem. By the end of the course, students are expected to have a complete draft of the literature review chapter of their thesis or dissertation.
PREREQ: GEOG601 RESTRICTIONS: Open to graduate students in geography and climatology.

**GEOG 604 GIS for Environmental Research** 3
Explores the application of GIS to environmental problems. Reviews current research in the field, and implements relevant techniques for analysis of a variety of environmental problems.

**GEOG 605 Computer Programming for Environmental Research** 2
Using a mixture of guided self-study and lecture, students learn modern Fortran programming for application to environmental data analysis and atmospheric and geological modeling. Older language features and use of legacy codes are also covered lightly.

**GEOG 606 Ocean and Atmosphere Remote Sensing** 3
Fundamentals of ocean and atmosphere remote sensing including space platforms, their orbits, instruments, data retrieval and image processing methods. Oceanographic and atmospheric applications of remote sensing and new developments in sensors and data analyses.
Crosslisted with MAST606.

**GEOG 608 Heat and Light in Nature - Radiative Transfer** 3
The energetic interaction of sunlight with the atmosphere and oceans influences the entire earth system. Examines the theory of radiative transfer within the ocean and atmosphere, and then explores several areas of applicable research including climate modeling and remote sensing.
Crosslisted with MAST608.

**GEOG 609 The Ocean & Climate Variation** 3
Study of the ocean-atmosphere system; the fluxes of heat, water and energy in the ocean and interchanges with the atmosphere; budgets and mechanisms of exchange; and interannual and long-term climate variations as related to the ocean. Crosslisted with MAST609.

**GEOG 611 Fluvial Geomorphology** 3
Crosslisted with GEOG611.

**GEOG 612 Physical Climatology** 4
Energy and moisture exchange between the atmosphere and land surface for characteristic natural and human-modified environments.
PREREQ: MATH241 and GEOG605.

**GEOG 613 Meteorological Processes for Wind Energy** 3
This course explores the fundamental concepts of meteorology that are needed to understand onshore, offshore, and airborne wind energy. Topics include: forces affecting winds; terrain and land-use effects; air turbulence; numerical modeling, wind power and energy from turbines; and wind measurement technologies. Crosslisted with MAST613.

**GEOG 615 Meteorological Processes in Air Pollution** 3
An introduction to meteorological processes that affect air pollution, such as diffusion, atmospheric stability, and turbulence, with a focus on the atmospheric boundary layer.
Crosslisted with MAST615. PREREQ: MATH 241 and MATH 242; CHEM104 or CHEM108 or PHYS201 or PHYS207.

**GEOG 617 Seminar in Climate Change** 3
Examines facts and fallacies regarding global warming and climate science and assesses the current state of scientific understanding of and ability to forecast climate change.
PREREQ: GEOG101 or GEOG152 or GEOG220 or equivalent.

**GEOG 620 Atmospheric Physics and Thermodynamics** 3
Introduction to composition and structure of the atmosphere. Includes atmospheric thermodynamics through introductory cloud physics.
PREREQ: MATH241 and GEOG220.

**GEOG 621 Physical Meteorology** 3
Physics and thermodynamics of cloud particles and precipitation. Includes cloud droplet growth, aggregation, precipitation, ice crystal formation, atmospheric electricity, optics, cloud-radiation interactions, acoustics and weather radar.

**GEOG 622 Resources, Development and the Environment** 3
Focuses on food, resources, energy and population issues in relationship to economic development and the global environment. Engages students in discussion and debate on sustainable development policies. May be crosslisted with UAPP622.

**GEOG 623 Atmospheric Dynamics** 3
Investigates atmospheric motion in a quantitative manner. Expands basic conservation laws to derive the equations of atmospheric motion and to develop the concepts of vorticity and circulation. Discusses atmospheric wave motion and general circulation.
PREREQ: MATH242 and GEOG220. COREQ: MATH243.

**GEOG 630 Food Geographies & Food Justice** 3
Examination of the historical and contemporary factors shaping the global food system. Studying processes and practices such as production and consumption, policymaking, activism, commodity exchange as well as actors including states, producers and consumers, farmers, workers and policymakers. Consider how production and consumption are framed and discuss the spatial organization of access to food and agricultural resources through digging into issues related to food justice and food sovereignty on local and global scales.

**GEOG 631 Watershed Hydro-Ecology** 3
Examines key linkages between hydrology and ecosystem processes in natural and human impacted watersheds. Topics include water quantity and quality and material source, transport and fate in terrestrial and aquatic ecosystems, as affected by biotic and abiotic stressors, including changes in land-use and climate.
PREREQ: MATH114 or MATH117; and GEOG432 or GEOG632.
GEOG 632  ENVIRONMENTAL HYDROLOGY 3
Introduction to hydrologic science. Topics include precipitation, snowmelt, evapotranspiration, infiltration, groundwater, runoff, streamflow, water resources management, and hydrologic applications of remote sensing and geographic information systems. Case studies illustrate hydrological response to changes in land-use and climate. Group studies include field measurements and computer simulations.
PREREQ: MATH114 or MATH117.

GEOG 634  PLAN SUSTAINABLE COMMUNITIES & REGIONS 3
Examines theory and methods for planning for more sustainable communities and regions in a global context in the twenty-first century. Sustainable development is defined and theories of sustainable planning presented that meet goals in the areas of environment, economy, and equity (the Three Es). After discussion of issues central to sustainable planning, course looks at tools for sustainable planning and how current land use and regional planning is and can become more oriented to sustainability. The University of Delaware is featured as an example of sustainable planning. May be crosslisted with UAPP706.

GEOG 636  RESEARCH TOPICS IN HISTORIC PRESERVATION 3
Seminar addresses a specific research issue within historic preservation including hypothesis construction, design of research methodology and evaluation of results. Emphasis on use of primary sources and application of database techniques. Crosslisted with UAPP636.

GEOG 638  WORLD CITIES IN COMPARATIVE PERSPECTIVE 3
World city as a new and distinctive geographic urban form in the world economy. Case studies explore common features of internal structure and external relationships of world cities, their growing environmental problems and extent to which they have decoupled from national cultures and economies. May be crosslisted with UAPP638.

GEOG 641  SUMMER INSTITUTE FOR GEOGRAPHY TEACHERS I 3
Explores the content, perspectives, and methods of geography, focusing on maps and spatial analysis (Delaware Geography Standard 1) and how humans interact with the physical environment (Delaware Standard 2). Content presented relates directly to the requirements of the K-12 Delaware Content Standards in Geography.

GEOG 642  SUMMER INSTITUTE FOR GEOGRAPHY TEACHERS II 3
Explores the content, perspectives, and methods of geography, focusing on the geographic concept of Place (Geography Standard 3) and Region (Geography Standard 4). Content presented relates directly to the requirements of the K-12 Delaware Content Standards in Geography.

GEOG 644  ADVANCED SUMMER INSTITUTE FOR GEOGRAPHY TEACHERS 3
Designed as a summer institute for K-12 teachers of geography who desire additional instruction in specialized areas of geographical education. Topics include geographical information systems, transportation geography, climatic change, and Arctic Geography. PREREQ: GEOG641 and GEOG642.

GEOG 645  METHOD AND THEORY IN GEOGRAPHY 3
The nature of geography, its history, methodology and applications in research and societal problems. A preprofessional course.

GEOG 646  POLITICAL ECOLOGY 3
Introduces students to the subfield of Political Ecology within Geography. Political ecology is concerned with the political and economic factors that shape the use of natural resources.

GEOG 649  ENVIRONMENT AND SOCIETY 3
Considers the relationships between environmental and social processes from theoretical, philosophical, and methodological perspectives of geography. Explores the ethical and contextual implications implied in framing environmental questions and posing solutions. Examines approaches to the geographical analysis of environmental problems.

GEOG 650  GLOBAL AT HOME 3
Impacts of global migration on immigrant-receiving and/or immigrant-sending communities are examined to understand the experience of home. Perceptions, policies and practices contributing to social-spatial exclusion/inclusion at multiple scales are addressed. Project-based fieldwork enables students to gain first-hand knowledge of the experiences of mobility and adjustment.

GEOG 651  MICROCLIMATOLOGY 4
Introduction to instrumentation and techniques involved in microclimatic monitoring and sampling. Field observation carried out in varying environmental situations.

GEOG 652  SEMINAR IN CLIMATOLOGY 3-12
General theoretical and practical considerations of research in climatology. RESTRICTIONS: Requires permission of instructor.

GEOG 653  METEOROLOGICAL ANALYSIS I 3
The collection, visualization and application of meteorological data is emphasized in the context of diagnosing and forecasting atmospheric systems. The interpretation of meteorological observations and numerical models is a major focus of this class.
PREREQ: GEOG6220.

GEOG 654  METEOROLOGICAL ANALYSIS II 3
The application of theory and real-time observations in diagnosing present and predicting future weather. Focus is on application of quasi-geostrophic theory and isentropic analysis in weather forecasting. Analysis and interpretation of meteorological observations and numerical models will be emphasized and applied to jet streams, mid-latitude cyclones and fronts.
PREREQ: GEOG653.

GEOG 656  HYDROCLIMATOLOGY 3
Study of the hydrologic cycle as it relates to water in the atmosphere and in and on the earth's surface. Hydrologic processes including precipitation, soil moisture, evapotranspiration, runoff and streamflow will be examined.
PREREQ: MATH241.

GEOG 657  CLIMATE DYNAMICS 3
Investigation of the physical processes controlling global climate, starting with the earth-sun relationship and adding additional processes to increase complexity and realism. Extensive use of models to explore the importance of each process. PREREQ:MATH201 or STAT475 or STAT200.

GEOG 658  PALEOClimATOLOGY 3
Covers the factors that cause natural variations in Earth's climate on different time scales, focusing on biotic, geologic, and geochemical records. Includes discussion of changing continental configurations, atmospheric greenhouse gas levels, and the Earth-Sun geometry on ocean circulation and climate change. May be crosslisted with GEOL658, MAST658.

GEOG 659  REGIONAL CLIMATE MODELING: TECH & APPL 3
Global change is impacting an increasing number of sectors in science, engineering and policy, creating a need for high-resolution regional climate data used in impact assessments and mitigation plans. The primary objective is to understand regional climate processes, modeling techniques, and tools for analysis. May be crosslisted with MAST659. PREREQ: MATH201 or STAT475 or STAT200.

GEOG 660  STATISTICS FOR EARTH SCIENCES 3
Multiple regression and time series analysis; model validation; sampling; principal components; factor analysis; cluster analysis; discriminant analysis; and statistical software routines. Crosslisted with STAT657. PREREQ: MATH201 or STAT475 or STAT200. RESTRICTIONS: Cannot be taken for credit in the Statistics master’s degree program.

GEOG 661  INTRODUCTION TO OCEAN MODELING 3
Introduction to numerical methods used to solve the equations of ocean motion. Topics range from basic numerical concepts with applications to general transport and shallow-water equations to an overview of turbulence and ocean circulation models that are employed to understand weather and climate. Crosslisted with MAST661. PREREQ: CIEG639, or permission from instructor.

GEOG 662  SPATIAL STATISTICS 3
Some research applications require inferences to be drawn from point, line, or areal data, rather than from the traditional univariate or multivariate framework. A number of such techniques have been developed including adaptations from classical statistical methods and novel approaches to account for the spatial nature of data. Explore the emerging literature on statistical methodologies that have been explicitly developed for the solution of spatial problems. Crosslisted with MAST659. PREREQ: MATH201 or STAT475 or STAT200. RESTRICTIONS: Can not be taken for credit in the Statistics Master’s Degree program.

GEOG 670  GEOGRAPHIC INFORMATION SYSTEMS AND SCIENCE 3
Introduces the principles and concepts of geographic information science to effectively use a professional level geographic information system. Practical hands-on exposure to "real" data and GIS software and hardware is provided through exercises and a final project.
GEOL 105 GEOLOGICAL HAZARDS AND THEIR HUMAN IMPACT 3
Geological processes and events that adversely affect humans and civilization. Methods for predicting and dealing with geological hazards. May be taken with a 1 credit lab, GEOL115.

GEOL 107 GEOLOGY OF DYNAMIC EARTH 4
Principles of physical geology and its application in interpreting earth processes. Laboratory covers identification of earth materials and the interpretation of topographic and geologic maps.

GEOL 108 VOLCANOES AND EARTHQUAKES 3
Violent geologic activity as illustrated by volcanoes and earthquakes. The nature, causes and origins of volcanic and earthquake activity, their interactions with humans and their potential control.

GEOL 109 PLANETS, ASTEROIDS AND IMPACTS 3
Composition, structure, surface features, origin, and evolution of the planets, satellites, asteroids, and comets. Also explores the possible connection between meteorite impacts and mass extinctions. Did an asteroid kill off the dinosaurs?

GEOL 110 EARTH HISTORY 4
History of the earth and its biota. Origins, evolution and mass extinctions of major groups of organisms as demonstrated by the earth's fossil record. Laboratory covers identification of basic fossil groups and exercises in interpreting Earth history.

GEOL 111 GEOLOGY OF DELAWARE AND ITS NEIGHBORS 3
Introduction to the geologic setting of Delaware and neighboring states. Rocks and fossils of the region. Emphasis on formation and evolution of the region through geologic time. Studies Delaware's coastal zone and the effect of coastal processes on recent geologic history of Delaware.

GEOL 112 EARTH RESOURCES AND PUBLIC POLICY 3
Introduction to the geologic occurrence of resources including water, energy, metals and industrial minerals. Discussion of the geology, politics and economics of resource extraction and utilization. Environmental implications of resource use; methods of estimation of resource availability.

GEOL 113 EARTH SCIENCE 4
Earth materials, structure, and the geologic phenomena that produce them. Physical and temporal aspects of earth history. Laboratory examination of rocks, minerals and fossils. Experiments in geological processes and interpretation of geologic maps. RESTRICTIONS: Open to education majors and other selected programs.

GEOL 115 GEOLOGICAL HAZARDS LABORATORY 1
Laboratory investigation of environmental geological processes and their impact on society: earthquakes, volcanoes, coastal hazards, rivers and streams, groundwater. Identification of earth materials and study of earth processes using topographical, geological and tectonic maps. COREQ: GEOL105

GEOL 120 LIFE'S A BEACH: GEOLOGICAL PROCESSES & LIVING WITH THE COAS 3
Introduction to geology of the coast. "Reading" beaches by geological phenomenon and physical processes. Historical and contemporary analysis of how populations have chosen to live with or against the natural dictates of the shore with costly and tragic consequences. One-day field trip required. May be crosslisted with MAST120.

GEOL 130 GEOLOGY OF THE NATIONAL PARKS 3
Introduction to field geology using some of the best geological features of the world found in U.S. national parks. Travel for 3 to 4 weeks to nearly a dozen parks where hands-on experiences are used to evaluate how the Earth works.
George 202 Earth Materials 4
Study of Earth materials including the chemistry, structure, and formation of Earth's minerals and rocks, in the context of major rock- and sediment-forming processes.
PREREQ: GEOL107.

GEOL 203 Surficial Processes 4
Processes and history of near-surface geologic environments of the Earth (potential areas of focus may include rivers, hillslopes, coastal environments, deltas, glaciers, periglacial environments, etc.). Human impacts on surficial environments.
PREREQ: GEOL107.

GEOL 205 Earth Surface Processes 4
Processes and history of near-surface geologic environments of the Earth (potential areas of focus may include rivers, hillslopes, coastal environments, deltas, glaciers, periglacial environments, etc.). Human impacts on surficial environments.
PREREQ: GEOL107.

GEOL 215 Full of Hot Air Understand Climate Chig 3
Understanding climate and climate change is important for everyone. Explores climate change and its impacts at local, regional, and global levels. Policy and decision making, as well as adaptation and mitigation will be discussed with a focus on current events. Crosslisted with MAST215.

GEOL 302 The Earth's Materials II: Rocks 4
Identification, description, occurrences, origins and uses of rocks and ores.
PREREQ: GEOL105 and GEOL115, or GEOL107, or GEOL113; GEOL300.

GEOL 304 Sedimentology and Stratigraphy 4
Study of sediment focusing on how it is transported and deposited including fluid flow and sediment transport, sedimentary structures and textures. Environments of deposition with modern/ancient analogs. Description and correlation of stratigraphic units including facies analysis, basin analysis and concepts of time and methods of absolute dating.
PREREQ: GEOL202 and GEOL203.

GEOL 305 Structural Geology and Plate Tectonics 4
The study of geologic structures, geologic stress and the responses of rocks to stress. Examines plate tectonics and the major structural and tectonic relations generated at plate boundaries.
PREREQ: GEOL202 and GEOL203.

GEOL 306 Geoscience Field Methods 4
This is a 30-day-long field course in the western USA focused on advanced training and experience in geological field methods. Key topics include rock descriptions, stratigraphic analysis and correlation, structural methods, and geologic map construction and interpretation.
PREREQ: GEOL105 and GEOL115, or GEOL107, or GEOL113; GEOL305.

GEOL 307 The Earth's History I: Paleobiology 4
Recognition, biology and paleobiology of major groups of invertebrates. Use of the fossil record in solving environmental and paleoenvironmental problems.
Principles of stratigraphy and correlation in origin and development of the geologic time scale.
PREREQ: GEOL105 and GEOL115, or GEOL107, or GEOL113.

GEOL 308 The Earth's History II: Earth System Science 4
Interaction and evolution of the lithosphere, biosphere, hydrosphere and atmosphere. Examination of the geologic record as a test for hypotheses about earth system processes including climate change, paleoceanography and tectonics. Integrative study of the history of the earth and its inhabitants.
PREREQ: GEOL105 and GEOL115, or GEOL107, or GEOL113; GEOL307.

GEOL 341 Climate and Climate Change 3
Understanding the earth's climate and how the climate is changing is a fundamental part of modern earth system science. Explores the scientific basis for the study of climate and climate change, including long term and modern change, with a discussion of current topics. Crosslisted with GEOG341.

GEOL 366 Independent Study 1-3

GEOL 401 Senior Seminar: Topics in Geoscience 3
Integrated examination of topics and concepts of current interest and importance in geoscience. Topics may vary.
PREREQ: Senior geology majors only, within 30 credits of graduation.

GEOL 405 Introduction to Research 1-3
Undergraduate research carried out under the supervision of the staff. Written report required.
RESTRICTIONS: May be repeated once if project warrants it.

GEOL 408 Geomicrobiology 4
Problem-based exploration of interface between geological and biological processes. Focus on effects of microorganisms and Earth's chemistry. May include biomineralization, origin and evolution of life, microbial weathering and rock formation, environmental problems. 2-3 Saturday field trip req.

GEOL 411 Fluvial Geomorphology 3
Hydrologic and sediment transport processes in rivers and watersheds. Morphology and evolution of rivers and watersheds. Depositional processes and evolution of floodplains. Structure and interpretation of fluvial deposits in the geologic record. May be crosslisted with GEOG411. PREREQ: GEOL107 or permission of the instructor.

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 sucessions throughout the world and their correlation and absolute dating.
PREREQ: GEOL107 or permission of the instructor.

GEOL 416 Paleoecology 3
Paleoenvironmental and stratigraphic interpretation of sediments and fossils. Basic statistics, bioturbation models, well-logging and sequence stratigraphy. Application to geology problems.
PREREQ: GEOL107 or permission of the instructor.

GEOL 421 Environmental and Applied Geology 3
The application of geologic principles to matters of environmental concern. Discussion of examples and case histories in water supply, waste disposal, zoning and land use, mining, legislation, regulation and professionalism emphasizing the role of geologist and the educated citizen.
PREREQ: GEOL107 or permission of the instructor.

GEOL 422 OSHA 40-Hour Hazardous Materials Safety Training 3
OSHA 40-hour safety training certification hazardous waste operations health and safety training program. Includes material from environmental regulations, hazard recognition, toxicology, environmental monitoring, personal protective equipment, site characterization and analysis, site zone and control, health and safety plans, decontamination and spill response recovery.
RESTRICTIONS: GEOL122 cannot be applied toward the nine credits of 400-level geology electives required of BS geology majors.

GEOL 427 Introduction to Geological Remote Sensing 3
Principles of active and passive remote sensing data interpretation for geologists. Study of geomorphic, structural, and lithologic characteristics of the Earth as observed in aerial and satellite data. Emphasis on the use of multispectral, radar, and LiDAR data for geologic mapping.

GEOL 428 Hydrogeology 3
PREREQ: MATH241 (MATH242 recommended) or permission of the instructor.

GEOL 434 Geology of Coasts 3
Erosional, depositional and tectonic processes; morphology and classification, and geologic history of the coastal areas of the world.
PREREQ: GEOL107 or permission of the instructor.

GEOL 453 Introduction to Geophysics 3
Introduction to geophysical methods that may include seismic reflection and refraction, side-scan sonar, multibeam sonar, ground-penetration radar (GPR), LiDAR, and resistivity exploration methods and interpretations. Additional topics that could be addressed include seismology, magnetism, gravity, and geodesy.
PREREQ: GEOL107 or GEOL105/115 or GEOL113; PHYS201; MATH113, MATH117, MATH221, or MATH241.

GEOL 458 Paleoclimatology 3
Covers the factors that cause natural variations in Earth's climate on different time scales, focusing on biotic, geologic, and geochemical records. Includes discussion of changing continental configurations, atmospheric greenhouse gas levels, and the Earth-Sun geometry on ocean circulation and climate change.
Crosslisted with GEOG458.

GEOL 466 Independent Study 1-3

GEOL 482 Physical Geography of Cold Environments 3
Survey and analysis of land surface processes in polar and mountain environments. Emphasis on the ground thermal regime, permafrost, periglacial (cold climate, nonglacial) landforms and environmental problems in cold regions. Crosslisted with GEOG482. PREREQ: GEOL106 or GEOL105/115 or GEOL107.
GEOL 485 GEOMORPHOLOGY 3
Survey of natural landforms and the processes that shape them. Topics include landscape evolution, dynamic equilibrium, rates of landform change, and the topographic response to tectonic and climatic forcing. Crosslisted with GEOG485. PREREQ: GEOL107 or permission of the instructor.

GEOL 501 TOPICS IN MIDDLE SCHOOL GEOLOGY EDUCATION: WATERSHEDS 3
Application of geologic principles to topics related to watersheds, ground and surface waters, topographic maps, point and non‐point sources of pollution, the water cycle, and drinking water. PREREQ: GEOL107 RESTRICTIONS: Restricted to in‐service middle school teachers.

GEOL 502 TOPICS IN MIDDLE SCHOOL GEOLOGY EDUCATION: EARTH HISTORY 3
Application of geologic principles to topics related to Earth’s history including: the rock record, relative and absolute dating of rocks, the fossil record, correlation of rocks and fossils, the geologic time scale, and the history of geologic events in Delaware. RESTRICTIONS: Restricted to in‐service middle school science teachers.

GEOL 601 GEOLOGICAL SCIENCES AT DELAWARE 1 PF
Overview of the graduate program in geology at the University of Delaware. Research opportunities and current activities. Orientation in department practices and procedures. Guidelines for preparation of research proposals. Professional activities and career options.

GEOL 603 GROUNDWATER MODELING 3
Introduction to groundwater flow and solute transport modeling. Begins with simple analytical models progressing to basic numerical methods and hands‐on use of widely‐used codes including MODFLOW, MT3DMS, SUTRA. Some MATLAB experience recommended. PREREQ: GEOL104 or GEOL605 or CIEG498/CIEG698.

GEOL 604 WRITING IN GEOSCIENCE 3
Approaches to writing in the geosciences. Students will write, edit, and prepare a paper for publication.

GEOL 605 STRATIGRAPHY 3
Principles of stratigraphy and application of stratigraphic methods (e.g., lithostratigraphy, biostratigraphy, chronostratigraphy, sequence stratigraphy and magnetic stratigraphy) for basin analysis. Interpretation of sedimentary facies. Application of sequence stratigraphy to the Quaternary Period. RESTRICTIONS: Graduate students only.

GEOL 608 GEOMICROBIOLOGY 4
Problem‐based exploration of interface between geological and biological processes. Focus on effects of microorganisms and Earth’s chemistry. May include biomineralization, origin and evolution of life, microbial weathering and rock formation, environmental problems. 2‐3 Saturday field trip req.

GEOL 611 FLUVIAL GEOMORPHOLOGY 3

GEOL 614 QUATERNARY GEOLOGY AND GECHRONOLOGY 3
Survey of the stratigraphy and chronology of marine and terrestrial records and theories of climatic change. Studies of the stratigraphy of significant Quaternary successions throughout the world and their correlation and absolute dating.

GEOL 616 PALEOECOLOGY 3
Paleoenvironmental and stratigraphic interpretation of sediments and fossils. Basic statistics, bioturbation models, well‐logging, and sequence stratigraphy. Application to geology problems.

GEOL 621 ENVIRONMENTAL AND APPLIED GEOLOGY 3
The application of geologic principles to matters of environmental concern. Discussion, examples, techniques and case histories in water supply, waste disposal, zoning and land use, mining, legislation, regulation and professionalism emphasizing the role of the geologist and the educated citizen.

GEOL 622 OSHA 40‐HOUR HAZARDOUS MATERIALS SAFETY TRAINING 3
OSHA 40‐Hour safety training certification hazardous waste operations health and safety training program. Includes material from environmental regulations, hazard recognition, toxicology, environmental monitoring, personal protective equipment, site characterization & analysis, site zone & control, health & safety plans, decontamination, and spill response recovery.

GEOL 628 HYDROGEOLOGY 3

GEOL 630 HYDROGEOLOGY SEMINAR 3
Explore the foundations of modern Hydrogeology by analyzing classic papers that advanced the field toward its current state-of-the‐art. Topics vary from physical hydrogeology to geochanical aspects, including groundwater age dating and tracking. RESTRICTIONS: Previous background in Hydrogeology.

GEOL 631 GEOLOGY OF COASTS 3
Erosional, depositional and tectonic processes; morphology and classification; and geologic history of the coastal areas of the world.

GEOL 633 INTRODUCTION TO GEOPHYSICS 3
Introduction to geophysical methods that may include seismic reflection and refraction, side‐scan sonar, multibeam sonar, ground‐penetration radar (GPR), LiDAR, and resistivity exploration methods and interpretations. Additional topics that could be addressed include seismology, magnetism, gravity, and geodesy.

GEOL 637 STATISTICS FOR EARTH SCIENCES 3
Multiple regression and time series analysis; model validation; sampling; principal components; factor analysis; cluster analysis; discriminant analysis; and statistical software routines. Crosslisted with STAT657. PREREQ: MATH201 or STAT475 or STAT200. RESTRICTIONS: Cannot be taken for credit in the Statistics master’s degree program.

GEOL 658 PALEOClimatology 3
Covers the factors that cause natural variations in Earth’s climate on different time scales, focusing on biotic, geologic, and geochanical records. Includes discussion of changing continental configurations, atmospheric greenhouse gas levels, and the Earth‐Sun geometry on ocean circulation and climate change. Crosslisted with GEOG658.

GEOL 659 SPATIAL STATISTICS 3
Some research applications require inferences to be drawn from point, line, or areal data, rather than from the traditional univariate or multivariate framework. A number of such techniques have been developed including adaptations from classical statistical methods and novel approaches to account for the spatial nature of data. Explore the emerging literature on statistical methodologies that have been explicitly developed for the solution of spatial problems. Crosslisted with STAT659. PREREQ: MATH201 or STAT475 or STAT200. RESTRICTIONS: Can not be taken for credit in the Statistics Master’s Degree program.

GEOL 663 GEOLOGICAL ASPECTS OF OFFSHORE WIND 3
Investigation of the geological and geotechnical aspects of offshore wind projects. Emphasis on influence of geology and physical properties of sediments and rocks on offshore wind project site selection, design, construction, and operation.

GEOL 682 PHYSICAL GEOGRAPHY OF COLD ENVIRONMENTS 3
Survey and analysis of land surface processes in polar and mountain environments. Emphasis on the ground thermal regime, permafrost, periglacial (cold climate, non‐glacial) landforms and environmental problems in cold regions. Crosslisted with GEOG682.

GEOL 685 ADVANCED GEOMORPHOLOGY 3
Survey of natural landforms and the processes that shape them. Topics include landscape evolution, dynamic equilibrium, rates of landform change, and the topographic response to tectonic and climatic forcing. May be crosslisted with GEOG685.
**PREREQ:** Completion GEOL 969.

**Topics in Geophysics**

1-3

Selected topics in geophysics. Topics vary according to instructor’s preference. RESTRICTIONS: May be taken more than once for graduate credit.

**Topics in Geomorphology**

1-3

Selected topics in geomorphology. Topics vary according to instructor preference. May be crosslisted with GEOG803. RESTRICTIONS: May be taken more than once for graduate credit.

**Topics in Geochemistry**

1-3

Selected topics in geochemistry. Topics vary according to instructor preference. RESTRICTIONS: May be taken more than once for graduate credit.

**Topics in Sedimentology and Stratigraphy**

1-3

Selected topics in sedimentology and stratigraphy. Topics vary according to instructor’s preference. RESTRICTIONS: May be taken more than once for graduate credit.

**Topics in Coastal Geoscience**

1-3

Selected topics in coastal geoscience. Topics vary according to instructor preference. RESTRICTIONS: May be taken more than once for graduate credit.

**Topics in Paleobiology**

1-3

Selected topics in paleobiology. Topics vary according to instructor’s preference.

**Topics in Hydrogeology**

1-3

Selected topics in Hydrogeology. Topics vary according to instructor preference. May be taken more than once for graduate credit. PREREQ: GEOL428/GEOL628 or CIEG498/CIEG698.

**Topics in Hydrogeology**

3-15

Selected topics in Hydrogeology. Topics vary according to instructor preference. May be taken more than once for graduate credit. RESTRICTIONS: Graduate students only.

**Topics in Geomicrobiology**

3-15

Topics vary according to instructor preference. May be taken more than once for graduate credit. RESTRICTIONS: Graduate Students Only.

**Introduction to the field of isotope geochemistry and the application of isotope systematics to the study of geological, geochemical, hydrological, atmospheric and marine cycles. Light stable isotopes, uranium thorium decay series nuclides, and long-lived heavy isotopes are considered.**

**Paleoceanography**

3

Focuses on processes related to climate change from tectonic to millennial timescales based on the marine sedimentary record of the past 65 million years. Topics include light stable isotopes and biogeochemical cycling of elements. Includes lectures and student-lead discussion of current literature. Crosslisted with MAST857. RESTRICTIONS: Requires permission of instructor.

**Research**

1-9

Enables students to begin planning work and research before admission to dissertation candidacy and GEOL969.

**Master’s Thesis**

1-6

**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.

**Doctoral Dissertation**

1-12 PF

**Ancient Prose: Intermediate Greek**

3

Focuses on the works of one or more prose authors with particular attention to review of grammar and syntax. Readings will be drawn from the philosophical, historical, and oratorical works of authors such as Plato, Herodotus, Xenophon, Lysias, Demosthenes, and Isocrates in rotation or in combination. PREREQ: GREK102 or equivalent.

**Ancient Poetry: Intermediate Greek**

3

Focuses on the works of one or more poets. Readings will be drawn from the epic, lyric, and dramatic (tragic and comic) works of authors such as Homer, Sappho, Pindar, Aeschylus, Sophocles, Euripides, and Aristophanes in rotation or in combination. PREREQ: GREK 201 or equivalent. RESTRICTIONS: Satisfies College of Arts and Sciences language requirement.

**Ancient Prose: Advanced Intermediate Greek**

3

Focuses on the works (in the original language) of one or more prose authors with particular attention to interpretative issues such as themes and contemporary intellectual and cultural milieu. Readings drawn from the philosophical, historical, and oratorical works of authors such as Plato, Herodotus, Xenophon, Lysias, Demosthenes, and Isocrates in rotation or in combination. PREREQ: GREK202 or equivalent. May be repeated for credit four times.

**Ancient Poetry: Advanced Intermediate Greek**

3

Advanced intermediate level course in ancient Greek focusing on the works (in the original language) of one or more poets. Readings will be drawn from the epic, lyric, and dramatic (tragic and comic) works of authors such as Homer, Sappho, Pindar, Aeschylus, Sophocles, Euripides, and Aristophanes in rotation or in combination. PREREQ: GREK202 or equivalent. May be repeated for credit four times.

**Independent Study**

1-3

**Independent Study**

1-3

**German**

**German I - Elementary**

4

Completion of basic German. Increasing mastery of the basic skills of speaking, listening, reading and writing skills through the use of basic texts.

**German II - Elementary/Intermediate**

4

Review of grammar, continued practice in speaking and writing, and reading texts of adequate difficulty. PREREQ: GRMN106. RESTRICTIONS: Two to three years of high school German acceptable in lieu of prerequisite.

**German III - Intermediate**

4

Review of grammar, continued practice in speaking and writing, and reading texts of adequate difficulty. PREREQ: GRMN106. RESTRICTIONS: Four years of high school German acceptable in lieu of prerequisite. Satisfies College of Arts and Sciences language requirement.

**Intermediate German I**

3

Review of grammar. Increasing mastery of the basic skills of speaking, listening, reading and writing. PREREQ: GRMN102 or GRMN106. RESTRICTIONS: Three years of high school German acceptable in lieu of prerequisite.

**Intermediate German II**

3

Continued practice in speaking and writing, reading texts of average difficulty, grammar review as needed. PREREQ: GRMN111. RESTRICTIONS: Four years of high school German acceptable in lieu of prerequisite. Satisfies Arts and Sciences foreign language requirement.

**German Grammar Review**

3

Systematic review of elementary and intermediate German grammar. Emphasis on grammar. Conversational practice. PREREQ: GRMN107. RESTRICTIONS: Not intended for students who have already taken a 300 or 400-level course in German.

**German Conversation**

3

Practical use of German by means of oral reports and discussions. Emphasis on improvement of basic conversational skills. Grammar review and written work where appropriate. PREREQ: GRMN107 or one 200-level German course. RESTRICTIONS: Not intended for students who have already taken a 300 or 400-level course in German.
<table>
<thead>
<tr>
<th>Course ID</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
<th>Prerequisites/Restrictions</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>GRMN 206</td>
<td>CULTURE THROUGH CONVERSATION</td>
<td>3</td>
<td>Discussion of topics drawn from contemporary German life. Designed to broaden knowledge of German culture while improving oral and aural language skills. PREREQ: GRMN107 RESTRICTIONS: Taught abroad only.</td>
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<tr>
<td>GRMN 208</td>
<td>CONTEMPORARY GERMANY I</td>
<td>3</td>
<td>An introduction to contemporary German history, 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.</td>
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<tr>
<td>GRMN 211</td>
<td>GERMAN READING AND WRITING</td>
<td>3</td>
<td>Reading and discussion of 20th-century German short stories and novellas. Several short compositions. Grammar review where appropriate. PREREQ: GRMN107 RESTRICTIONS: Not intended for students who have already taken a 300- or 400-level course in German.</td>
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<tr>
<td>GRMN 235</td>
<td>GERMAN POPULAR CULTURE</td>
<td>3</td>
<td>Examines aspects of German popular culture, especially youth culture: customs, attitudes, pastimes, audio, print and visual media preferred by German youth. Students exposed to colloquial German used within everyday contexts. PREREQ: GRMN107 RESTRICTIONS: Not intended for students who have already taken a 300- or 400-level course in German.</td>
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<tr>
<td>GRMN 246</td>
<td>GERMAN YOUTH CULTURE</td>
<td>3</td>
<td>Aspects of German youth culture, including customs, attitudes, and pastimes preferred by students in Germany. Focus on reading, writing, and audiovisual media. Topics include fashion, sports, socialization represented in variety of media, such as TV, film and print media. Taught in German. PREREQ: GRMN107 RESTRICTIONS: Not intended for students who have already taken a 300- or 400-level course in German.</td>
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<tr>
<td>GRMN 255</td>
<td>GERMANY IN THE NEWS</td>
<td>3</td>
<td>Explores topics in contemporary German society, culture and politics as expressed in the news media. Emphasis on current events and issues of Germany. Focus of study is the German press: newspapers and magazines printed in the German language. PREREQ: GRMN107 RESTRICTIONS: Not intended for students who have already taken a 300- or 400-level course in German.</td>
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<tr>
<td>GRMN 256</td>
<td>READING FOR CULTURAL AWARENESS</td>
<td>3</td>
<td>Introduction to German-speaking people's world view and way of life. Emphasis on reading and discussing a variety of short texts, with opportunities to fine-tune selected aspects of elementary/intermediate grammar. PREREQ: GRMN107 or the equivalent.</td>
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<tr>
<td>GRMN 300</td>
<td>ADVANCED GERMAN COMPOSITION &amp; GRAMMAR I</td>
<td>3</td>
<td>A thorough review and practice, targeting structure, essential vocabulary, speaking, listening, and extensive writing. PREREQ: Any two 200-level courses taught in German.</td>
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<tr>
<td>GRMN 305</td>
<td>GERMAN CONVERSATION AND PHONETICS</td>
<td>3</td>
<td>Discussion of current cultural, social and political topics in German-speaking countries. Pronunciation exercises and vocabulary building. PREREQ: Any two 200-level German courses.</td>
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<tr>
<td>GRMN 306</td>
<td>PRACTICAL ORAL/Written Expression</td>
<td>3</td>
<td>Strengthens grammar and vocabulary skills in preparation for advanced courses. Class exercises include oral exposures, discussion of articles and videos, textual analysis and compositions. PREREQ: Any two 200-level German courses. RESTRICTIONS: Taught abroad only.</td>
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<tr>
<td>GRMN 307</td>
<td>CONTEMPORARY AUSTRIA</td>
<td>3</td>
<td>Introduction to contemporary Austria, its people, their way of life and the issues confronting them. PREREQ: Any two 200-level courses taught in German. RESTRICTIONS: Taught abroad only. Taught in German.</td>
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<tr>
<td>GRMN 308</td>
<td>CONTEMPORARY GERMANY II</td>
<td>3</td>
<td>Discussion and study of issues related to contemporary cultural, political and social developments in Germany, including its place in today's European community. PREREQ: Any two 200-level German courses. RESTRICTIONS: Taught abroad only. Taught in German.</td>
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<tr>
<td>GRMN 311</td>
<td>INTRODUCTION TO MODERN GERMAN LITERATURE</td>
<td>3</td>
<td>Masterpieces of poetry, narrative prose and drama from the 18th century to the present. PREREQ: Any two 200-level German courses.</td>
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<tr>
<td>GRMN 325</td>
<td>GERMAN CIVILIZATION AND CULTURE</td>
<td>3</td>
<td>A survey of the major cultural, social and political developments in Germany from the mid-18th century to the present. PREREQ: Any two 200-level German courses.</td>
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<tr>
<td>GRMN 350</td>
<td>INTRODUCTION TO BUSINESS GERMAN</td>
<td>3</td>
<td>Familiarizes students with characteristics of business German (vocabulary, terminology and syntactical patterns) and aspects of the German business community. PREREQ: Any two 200-level German courses.</td>
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<tr>
<td>GRMN 355</td>
<td>SPECIAL TOPICS</td>
<td>3</td>
<td>Explores an area of special interest in German literature or culture studies. See <a href="http://primus.udel.edu/CoursesSearch/">http://primus.udel.edu/CoursesSearch/</a> for topics. PREREQ: Any two 200-level German courses. RESTRICTIONS: May be repeated for credit three times when topics vary.</td>
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<tr>
<td>GRMN 366</td>
<td>INDEPENDENT STUDY</td>
<td>1-3</td>
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<tr>
<td>GRMN 406</td>
<td>ADVANCED GERMAN LANGUAGE</td>
<td>3</td>
<td>Grammatical structure and stylistics with special attention given to technical vocabulary and discourse, e.g., business, law, science and agriculture. PREREQ: Two 300-level German courses, one of which may be taken concurrently with the 400-level course. RESTRICTIONS: Taught abroad only.</td>
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<tr>
<td>GRMN 412</td>
<td>EARLY GERMAN LITERATURE</td>
<td>3</td>
<td>Representative authors and themes: 12th-17th centuries. &quot;Courtly love&quot; and &quot;knighthood&quot; (Minnesen, Das Nibelungenlied); &quot;bourgeoisie&quot; vs. &quot;peasantry&quot; during the Reformation (Sach's Fastnachtspiele, Eulenspiegel); and the Baroque themes of &quot;carpe diem&quot; and &quot;memento mori&quot; (Grimmelshausen's Simplicissimus, Gryphius's plays, Baroque poetry). PREREQ: Two 300-level German courses, one of which may be taken concurrently with the 400-level course.</td>
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<td>GRMN 422</td>
<td>AGE OF GOETHE</td>
<td>3</td>
<td>Major works by Lessing, Lenz, Goethe, Schiller and their contemporaries. The importance of the Enlightenment, the Storm and Stress movement, the Classical period and early Romanticism. PREREQ: Two 300-level German courses, one of which may be taken concurrently with the 400-level course.</td>
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<tr>
<td>GRMN 433</td>
<td>NINETEENTH-CENTURY GERMAN LITERATURE</td>
<td>3</td>
<td>Studies major literary trends and figures from the end of Romanticism to Naturalism. PREREQ: Two 300-level German courses, one of which may be taken concurrently with the 400-level course.</td>
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<td>GRMN 442</td>
<td>FROM NATURALISM TO EXPRESSIONISM</td>
<td>3</td>
<td>Main literary currents from the 1880's to the 1920's. PREREQ: Two 300-level German courses, one of which may be taken concurrently with the 400-level course.</td>
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<tr>
<td>GRMN 453</td>
<td>GERMAN LITERATURE: 1945 TO 1989</td>
<td>3</td>
<td>Major authors and literary movements from the end of World War II until German unification. PREREQ: Two 300-level German courses, one of which may be taken concurrently with the 400-level course.</td>
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<tr>
<td>GRMN 455</td>
<td>SELECTED AUTHORS, WORKS AND THEMES</td>
<td>3</td>
<td>Works of one or more outstanding authors or a special theme. PREREQ: Two 300-level German courses, one of which may be taken concurrently with the 400-level course. RESTRICTIONS: May be repeated for credit three times when topics vary.</td>
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<tr>
<td>GRMN 465</td>
<td>POSTWALL GERMANY: LITERATURE AND CULTURE</td>
<td>3</td>
<td>Explores reunited Germany's cultural and literary landscape and examines how reunification has affected East and West Germans. Focuses on how reunification has (re) shaped German national identity, affected the way Germans remember the past and contribute to the formation of a multicultural society. PREREQ: Two 300-level German courses, one of which may be taken concurrently with the 400-level course.</td>
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<tr>
<td>GRMN 466</td>
<td>INDEPENDENT STUDY</td>
<td>1-3</td>
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<tr>
<td>GRMN 533</td>
<td>GERMAN READINGS FOR PH.D. CANDIDATES</td>
<td>3 PF</td>
<td>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.</td>
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<tr>
<td>GRMN 622</td>
<td>AGE OF GOETHE</td>
<td>3</td>
<td>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 200-level German courses.</td>
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**HDFS 101  HUMAN SERVICES AND CULTURAL COMPETENCE**  1
Provides an overview of human services and approaches to culturally competent practices; critical perspectives regarding diversity, society, race, class, gender and social policy are discussed.

**HDFS 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.

**HDFS 202  DIVERSITY AND FAMILIES**  3
Examination of diverse families in the United States with a focus on issues of race, ethnicity, social class, and gender. Emphasis is on the accelerating effects of globalization and social change.

**HDFS 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.

**HDFS 220  CHILD DEVELOPMENT I: PRENATAL TO AGE 3**  3
Study of prenatal development and the physical, perceptual, social-emotional, and cognitive-language developmental domains of children birth to three. Emphasis on nurturing relationships and understanding child development within cultural contexts of children’s families. Directed observation in infant/toddler settings.

**HDFS 221  CHILD DEVELOPMENT II: 3 TO 10**  3
Study of cognitive, social, emotional, and physical development of children three to ten years old. Variables that influence child development including family and school investigated. Directed observation of children.

**HDFS 222  INCLUSIVE CURRICULUM & ASSESSMENT: BIRTH - GRADE 2**  3
Curriculum, assessment and programming for optimal development of children birth to second grade in inclusive settings. Focus on curriculum approaches and examination of the role of play, constructivist theories, developmentally appropriate/culturally responsive practice.
PREREQ: HDFS221. COREQ: HDFS224 for ECE majors only.

**HDFS 224  PRACTICUM IN INCLUSIVE CURRICULUM & ASSESSMENT: BIRTH - GRADE 2**  3
Discussion and weekly practicum experience with children in early childhood settings. Focus on application of theory and reflective thinking. Experience in curriculum planning, assessment and guidance.
PREREQ: HDFS221. COREQ: HDFS222.

**HDFS 225  SPECIAL OLYMPICS RELATIONSHIP EXPERIENCE**  1-3 PF
Learn about and work one-on-one with people with intellectual disability. Includes brief history and program and policy issues concerning people with intellectual disability and their families. Field experience in athletic training with age peers who have intellectual disability. No athletic experience necessary. Background check required.

**HDFS 226  TEACHING ART TO CHILDREN**  3
Exploration of principles, methods and materials for teaching/exposing children to the arts through purposeful, process oriented experiences designed to support creative growth and divergent thinking and introduce them to the Reggio Emilia Approach. Working in the classroom with children ages 2 to 14 years Studio experience.

**HDFS 230  FAMILIES AND THEIR COMMUNITIES**  3
Discusses the community context of family life, and the interface of family with school, community and work settings. Community development, social capital, community, family and community asset building, and opportunity structure analysis approaches are presented.

**HDFS 235  SURVEY IN CHILD AND FAMILY SERVICES**  3
Introduction to the range of issues facing children and families as well as the scope of human service systems designed to address those needs.
RESTRICTIONS: Restricted to Human Services majors; Disabilities Studies Minors; and Sociology - Welfare track students.

**HDFS 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: HDFS221.

**HDFS 270  FAMILIES AND DEVELOPMENTAL DISABILITIES**  3
Focuses on people with developmental disabilities in the context of their family and culture from a multidisciplinary perspective. Covers disabilities and their causes; changing needs across the lifespan, gender, cross-cultural and legal issues; and information about prevention/intervention, employment, inclusion, and empowerment. May be crosslisted with SOC170.

**HDFS 271  ALCOHOL ISSUES & COLLEGE STUDENTS**  1-3
Focus on alcohol-related issues for college students, including legal and health issues. Media messages about alcohol use, including prevention messages, are emphasized.

**HDFS 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.

**HDFS 306  READING AND WRITING FROM BIRTH - GRADE 2**  3
Covers development of language and literacy from birth to second grade. Explores instructional and assessment strategies for promoting growth in speaking, listening, reading, and writing.
PREREQ: LING101, HDFS222 and HDFS224. Students must pass Praxis I prior to taking this course.
COREQ: HDFS350, HDFS412 and HDFS432.

**HDFS 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: HDFS201 and HDFS202.

**HDFS 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: EDUC205 or HDFS201.
HDFS 330  MENTOR & HELPING RELATIONSHIPS  3
Introduction to the core dimensions of mentoring and helping relationships: empathy, active listening, problem-solving, and cultural competence. Emphasis is on applying the skills in a variety of business, educational, medical, and community settings.

HDFS 331  POSITIVE YOUTH DEVELOPMENT  3
Positive Youth Development emphasizes a strength-based approach and focuses on youth development from a social, cultural and psychological perspective. Explores areas of youth functioning, including social, emotional, cognitive, and behavioral competencies. Through theory, research, and application, this course examines a myriad of factors including characteristics of the individual, family, school, and the larger society that can conceivably allow youth to develop in positive ways.

HDFS 332  COUNSELING THEORIES  3
Examination of selected counseling theories from theoretical, personal, functional and philosophical points of view.

HDFS 333  DEVELOPMENT OF HUMAN RELATIONSHIPS  3
Developmental theory and research related to intrapersonal and interpersonal conditions, characteristics, attitudes and behaviors necessary for effective human relationships. Basic focus on the psychology of the individual, relationship skills, conflict management and intimacy.

HDFS 334  EXPERIENTIAL EDUCATION  3
Field experience combined with a seminar emphasizing professional issues in human services, including portfolio development and career planning. Students should arrange for a 50 hour field placement prior to first week of class (see instructor). May be crosslisted with BAMS335. RESTRICTIONS: HMSV majors only or permission of instructor. Students planning to take HDFS334 must attend a course orientation prior to course enrollment (unless it is to be taken during as part of the Winter Session service-learning study abroad program).

HDFS 335  CULTURE IN CONTEXT  1-3
Cross-cultural awareness and sensitivity enriches an individual’s life, helping him/her to better understand the actions of groups of peoples, their nationalities and uniqueness, their organizations and systems. Provides an option which can be used both internationally and domestically as long as it embraces the spirit of exposing students to the concept of development within diverse communities. RESTRICTIONS: May be repeated up to six credits.

HDFS 338  SEXUALITY IN CONTEMPORARY SOCIETY  3
A multidisciplinary approach to controversial human sexuality issues which examines and addresses societal solutions to these controversies.

HDFS 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: HDFS201.

HDFS 340  EARLY CHILDHOOD CURRICULUM II  3
History, research and practical issues in the organization and operation of early childhood programs with emphasis on preschool and kindergarten settings; integrating and adapting the curriculum, facilities, equipment and instructional strategies to the needs of young children. Includes field experience. PREREQ: HDFS222 and HDFS224.

HDFS 345  MENTORING STUDENTS: INT & DEV DISAB  3
Through classroom and field experiences, students learn the role of a mentor for youth and adults who have intellectual and developmental disabilities and how to facilitate their academic, social and business relationships in higher education settings, the surrounding campus community, and at local work sites. Crosslisted with EDUC345.

HDFS 346  COUNSELING IN HUMAN SERVICES  3
Presents approaches to interviewing and counseling individuals and families in a variety of community-based human service settings. Includes case management, advocacy and empowerment strategies of intervention. Explores professional and ethical issues in providing individual and family services. PREREQ: HDFS235 and HDFS334 or permission of instructor. COREQ: HDFS334 or permission of instructor.

HDFS 347  PROGRAM DEVELOPMENT AND EVALUATION  3
Focuses on program development, administrative procedures, and program evaluation. Basic skills required for the development, delivery and evaluation of a wide range of human service programs including preventive interventions for families and individuals. PREREQ: HDFS235 and HDFS334 or permission of instructor. COREQ: HDFS334 or permission of instructor.

HDFS 349  AGING & SOCIETY  3
Historical, social, and cultural context influence everything from the meaning of growing old, the rate of development and the rate of age-related decline, to the meaning and significance of death and dying. Introduces students to the nature and the study of the human aging. Crosslisted with SOC349.

HDFS 350  TECHNOLOGY & ASSISTIVE TECHNOLOGY IN EARLY CHILDHOOD ED  3
The study of the impact technology and assistive technology have on teaching and learning in early childhood settings. Focus on the effective use of technology to develop curriculum, gather assessment data, and interact with children and families. Basic operation and evaluation of technical tools. PREREQ: HDFS222.

HDFS 355  PROFESSIONAL ISSUES IN ECDE  3
Overview and analysis of topics and issues for professionals serving children birth through grade two and their families in inclusive settings. PREREQ: HDFS222 or HDFS235.

HDFS 360  LEARNING IN COMMUNITY CONTEXTS  3
Study of the educational process in institutions and organizations with a focus on non-profit groups oriented toward community service. Emphasis upon the relation of these groups’ educational practices to their overall public service mission. Crosslisted with EDUC360.

HDFS 364  FIELD EXPERIENCES IN ADMINISTRATION & FAMILY POLICY  1-9
Provides opportunities to work/participate in human service agencies, business and industry, as well as formal and non-formal educational settings. May be repeated for up to nine credit hours. PREREQ: HDFS235 and HDFS334. RESTRICTIONS: Requires permission of instructor. Students must have a GPA of 2.5 and major field index of 2.75.

HDFS 365  SEMINAR  1-3

HDFS 366  INDEPENDENT STUDY  1-12

HDFS 401  FOUNDATIONS OF HUMAN SEXUALITY  3
A multidisciplinary study of human sexuality focusing on the implications for individuals and society of the biological, psychological and sociocultural determinants of human sexuality. Deals with sexually explicit material. May be crosslisted with BHAN401, WOBS401.

HDFS 402  CHILD AND FAMILY POLICY  3
Provides an historical overview of family and child policy in the United States, including policies toward children and families in poverty. The role of the economy, politics, race, class, gender, legal and advocacy issues are discussed. Satisfies a "developmental" elective requirement. PREREQ: HDFS235 and HDFS202 or permission of instructor. RESTRICTIONS: Junior and senior HMSV majors and HDFS minors.

HDFS 403  ADULT DISABILITY ISSUES  3
Civil/human rights and social policy impact on adults with intellectual and developmental disabilities through the lifespan. Disability history, public policy, legislation, litigation and contemporary issues. The full range of service types and ethical issues relevant to adults with ID/DD and their families will be discussed.

HDFS 405  AGING AND THE FAMILY  3
Explores developmental changes of older adults and impact on their family members. A major focus is on kinship and caregiving by family and decision making in selecting respite and institutional care when elders develop cognitive and physical disabilities.

HDFS 406  SUPPORTING LITERACY IN EARLY CHILDHOOD EDUCATION  3
Examines the research and theories to support language and literacy development in Early Childhood Education. Explores various instructional and assessment strategies to promote language and literacy of children from diverse background. PREREQ: HDFS222 or permission of instructor. RESTRICTIONS: Juniors and seniors only.
HDFS 407 SPEECH & LANGUAGE DISORDERS IN YOUNG CHILDREN 3
Examines disorders of speech and language understanding and use in children from birth to 8 years of age. Addresses assessment and intervention techniques, including the role of caregivers and service providers in the identification and remediation of communication difficulties.

HDFS 408 DOMESTIC VIOLENCE POLICY AND PREVENTION 3
Reflects the current state of policy and practice among policy makers and practitioners in the field of domestic violence including legal issues, policy development, primary prevention, and models of best practice. Addresses the role of federal and state law. May include economic justice, mental health and trauma, and alternative models. Crosslisted with WOMS408. PREREQ: Any 200-level Women’s Studies course.

HDFS 409 DOMESTIC VIOLENCE SERVICES 3
Examines issues in providing services to families in which domestic violence is occurring. Multiple service systems are explored, with emphasis on service coordination, service gaps, and public policy. May be crosslisted with CRUJ409, WOMS409. RESTRICTIONS: Open to juniors and seniors only.

HDFS 410 THE HOSPITALIZED CHILD 3
The psychosocial needs of pediatric patients and their caregivers are examined. Emphasis on coping, preparation, medical terminology, play, assessment and family-centered care. Implications for nursing care, child life specialists, pre-medical students and others working with the pediatric population are studied. PREREQ: HDFS201. RESTRICTIONS: Open to juniors and seniors only.

HDFS 411 INCLUSIVE CURRICULUM AND ASSESSMENT: INFANTS AND TODDLERS 3
Curriculum/programming for optimal development of children birth-36 months in inclusive settings. Focus on primary caregiving and continuity of care, routines as a basis for curriculum, assessment process, environmental designs, building relationships with children and families, and the IFSP process. PREREQ: HDFS222 and HDFS224. COREQ: HDFS431 and HDFS 470. RESTRICTIONS: Majors only or permission instructor.

HDFS 412 EARLY CHILDHOOD INCLUSIVE MATH CURRICULUM AND ASSESSMENT 3
Inclusive, integrated, interdisciplinary early childhood curriculum development and teaching with emphasis on early math development and learning, math content knowledge for teaching, and early math assessment for young children from birth through early primary grades. PREREQ: HDFS222 and HDFS224. ECE Students must pass a basic skills test as approved by the University Council of Teacher Education prior to taking this course. COREQ: HDFS432.

HDFS 413 EARLY CHILDHOOD INCLUSIVE SCIENCE CURRICULUM AND ASSESSMENT 3
Integrated early childhood curriculum development and teaching with emphasis on early science development and learning, science content knowledge and pedagogy for teaching, and early science assessment for young children from birth through early primary grades. PREREQ: HDFS222 and HDFS224. COREQ: HDFS433.

HDFS 414 GUIDANCE AND BEHAVIOR SUPPORT: BIRTH TO GRADE 2 3
Comparison of theoretical viewpoints underlying behavior. Provides an overview of positive behavior support (individual/schoolwide), including functional behavioral assessment. Emphasized is the importance of teaching socially acceptable responses to reduce and prevent problem behavior. Hands-on experiences address techniques and strategies including visual supports and increasing motivation. PREREQ: HDFS222 and HDFS224 for ECE majors only. COREQ: HDFS431, 432, or 433 for ECE majors. RESTRICTIONS: Requires permission of instructor for non-ECE majors.

HDFS 416 BOOKS FOR EARLY CHILDHOOD (INFANCY TO 8) 3
An in-depth examination of children’s books and the use of books for people who work with young children from infancy to age 8. Course topics include the study of developmentally and culturally appropriate books and application of children’s books in early childhood programs, parent education, and other programs serving diverse populations of young children.

HDFS 422 CAPSTONE IN FAMILY RELATIONSHIPS 3
An integrative analysis of interpersonal relationships and problems in courtship, marriage and the family in contemporary society. PREREQ: HDFS202, HDFS235, and HDFS334 or permission of instructor.

HDFS 424 PROFESSIONAL DEVELOPMENT SEMINAR I 3
Discussion-oriented and problem-centered seminar with emphasis on the role and contributions of the ECE professional; partnering with families in the development, care, and education of young children; building partnerships among families, agencies, schools, and communities; job search strategies; and professional portfolio development. COREQ: EDUC400 and HDFS441. RESTRICTIONS: ECE majors only.

HDFS 425 PROFESSIONAL DEVELOPMENT SEMINAR II 3
Continuation of HDFS424. Discussion-oriented and problem-centered seminar with emphasis on the role and contributions of the ECE professional; partnering with families in the development, care, and education of young children; building partnerships among families, agencies, schools, and communities; job search strategies; and professional portfolio development. COREQ: EDUC400 and HDFS442. RESTRICTIONS: Early Childhood Education majors only.

HDFS 427 PARENTING THROUGH THE LIFESPAN 3
Astudio focus on parenting styles, roles, issues and goals through the lifespan. Parent diversity, intergenerational relationships, developmental and acquired disabilities, and needs of children, adult children, extended family members, and parents are examined. PREREQ: HDFS201 or PSYC350 or permission of instructor.

HDFS 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.

HDFS 430 FAMILY LIFE EDUCATION 3
Investigates curriculum and instructional strategies for use in support, prevention and empowerment-based programs across the lifespan. May be crosslisted with WOMS430. PREREQ: HDFS201 or HDFS202.

HDFS 431 FIELD EXPERIENCE: INFANTS AND TODDLERS 1-3
Field-based experiences in a school, agency, or family setting with children. Collaboration with school, community and families in order to support ongoing work in the setting. PREREQ: HDFS222 and HDFS224. COREQ: HDFS411.

HDFS 432 FIELD EXPERIENCE: PRE-SCHOOL - KINDERGARTEN 2
Field-based experiences in a school, agency, or family setting with children ages three to six and discussion. Observation, instruction, and assessment of children. Collaboration with school, community and families in order to support ongoing work in the setting. PREREQ: HDFS222 and HDFS224. COREQ: HDFS412.

HDFS 433 FIELD EXPERIENCE: KINDERGARTEN - GRADE 2 2
Field-based experiences in a school, agency or family setting with children, kindergarten through second grade and discussion. Observation, instruction, and assessment of children. Collaboration with school, community and families in order to support ongoing work in the setting. PREREQ: HDFS222 and HDFS224. COREQ: HDFS413.

HDFS 435 PROGRAMS FOR CHILDREN WITH EXCEPTIONALITIES 3
Philosophy, organization, and operation of programs for children with exceptionalities. Focus on teaching in inclusive settings, and implementing developmentally appropriate practices. Addresses parent-professional partnerships, characteristics of specific disabilities and related interventions, IEP process, adaptation strategies, and positioning and handling techniques. PREREQ: HDFS222. COREQ: HDFS432. RESTRICTIONS: Early Childhood Education majors only or with permission of instructor.

HDFS 438 LEADERSHIP DEVELOPMENT IN HUMAN SEXUALITY 1-3
Seminar/practicum for organizing and leading discussion groups in human sexuality. Trains group leaders to facilitate effective communication skills & responsible sexual decisions, integrating research & theories with individual relationships & family life experiences. PREREQ: HDFS401. RESTRICTIONS: Requires permission of instructor. For undergraduate teaching assistants only.

HDFS 439 INSTRUCTION METHODS IN FAMILY/CONSUM SCI 3
Identification, selection and evaluation of developmentally appropriate strategies and resources for instruction in Family and Consumer Sciences in middle school and secondary classrooms and as well as with adults in community settings.

HDFS 440 EARLY CHILDHOOD ADMINISTRATION 3
Organization, management and evaluation of early childhood programs including quality programming and continuous improvement, personnel, family partnerships, facilities, business management and program policies.
HDFS 441 ADV INCLUS CURRIC IN EARLY CHILDHOOD I 3
Advanced study and application of child outcome assessment, using assessment to guide curriculum planning, using technology to support curriculum and teaching of English/Language Arts, Math, Science, Social Studies and the arts and social/emotional and fine and gross motor development.
COREQ: EDUC400 and HDFS424. RESTRICTIONS: ECE majors only.

HDFS 442 ADV INCL CURRICULUM IN EARLY CHILDHOOD II 3
Continuation of advanced study and application of child outcomes assessment, using assessment to guide curriculum planning, using technology to support curriculum and teaching of English/Language Arts, Math, Science, Social Studies and the arts and social/emotional, fine and gross motor development.
PREREQ: HDFS441. COREQ: EDUC400 and HDFS425. RESTRICTIONS: ECE Majors only.

HDFS 445 FAMILY, COMMUNITY AND SCHOOL PARTNERSHIPS 3
Explores the importance of families in the development, care, and education of young children. Building partnerships among families, agencies, schools, and communities is examined, including theory, research, case studies, program models, diversity in families, and community resources.
COREQ: HDFS334 or HDFS432, or permission of instructor.

HDFS 449 INTERNSHIP IN FAMILY AND COMMUNITY SERVICES 3-10 PF
On-the-job experience in a community and family service agency.
RESTRICTIONS: Requires permission of instructor.

HDFS 452 ASSESSMENT OF CHILDREN 3
Study of multiple roles of formal and informal assessment. Primary focus on integration of curriculum, assessment and programing. Strategies for family involvement will be identified.
PREREQ: HDFS220, HDFS221, HDFS222, and HDFS224. COREQ: HDFS431, HDFS432 or HDFS433 for ECE majors only.

HDFS 456 PROFESSIONAL DEVELOPMENT AND SUPERVISION 3
Theory and evidence-based practices in professional development and supervision in human services, school-age and early care and education settings. Emphasis on principles of adult development and learning and continuous growth through reflective practices and communities of practice.

HDFS 459 CHILD DEVELOPMENT PRACTICUM 1-9 PF
Supervised student teaching experience.
PREREQ: HDFS435, HDFS452 and HDFS470. RESTRICTIONS: Requires permission of instructor.

HDFS 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: HDFS221 and HDFS236.

HDFS 465 SEMINAR 1-3
Discusses professional issues in the delivery of human services.
COREQ: HDFS449.

HDFS 466 INDEPENDENT STUDY 1-12

HDFS 470 FAMILIES AND CHILDREN AT RISK 3
Study of social-emotional considerations of disabilities and risk factors upon development of children and families. Theory, research, and practices discussed with emphasis on family-professional collaboration, empowerment, family-focused practice, and cultural sensitivity.
PREREQ: HDFS201 or HDFS220 or HDFS221 or PSY325.

HDFS 472 SUBSTANCE ABUSE AND THE FAMILY 3
Provide an overview of substance abuse, with an emphasis on how it affects the family. Topics include definitions and trends, the physiological effects of substances, the psychological effects of substances, children of substance abusing parents, prevention, and intervention.

HDFS 475 TOPICS IN HUMAN DEVELOPMENT AND FAMILY STUDIES 1-3
Selected topics focusing on current issues affecting families from an interdisciplinary and global perspective. May be crosslisted with UAPP476. PREREQ: Vary by Instructor and topic.
RESTRICTIONS: Vary by Instructor and topic.

HDFS 480 STUDENT TEACHING SEMINAR 2 PF
Discussion-oriented and problem-centered seminar with emphasis on the role and contributions of the early childhood education professional.
COREQ: EDUC400.

HDFS 481 HONORS CAPSTONE STUDENT TEACHING SEMINAR 3
Discussion-oriented and problem-solving seminar with emphasis on role and contributions of the early childhood education professional. Includes introduction to teachers as researchers and completion of public presentation.
COREQ: EDUC400. RESTRICTIONS: Permission of instructor. Honors students only.

HDFS 490 INSTRUCTIONAL METHODS IN FAMILY AND CONSUMER SCIENCES 3
Identification, selection and evaluation of developmentally appropriate strategies and resources for instruction in Family and Consumer Sciences secondary classrooms and community settings. School practicum required.

HDFS 491 CURRICULUM AND ASSESSMENT IN FAMILY AND CONSUMER SCIENCES 3
Foundations of curriculum development and evaluation as applied to Family and Consumer Sciences secondary classrooms and community settings. School practicum required.
PREREQ: HDFS490.

HDFS 601 THEORIES OF HUMAN DEVELOPMENT 3
Overview and analysis of classic and contemporary theoretical approaches in human development. Special emphasis on research and theory concerning families as contexts of development.

HDFS 603 ADULT DISABILITY ISSUES 3
Public Policy and Contempory Issues in the Provision of Services for Adults with Intellectual and Developmental Disabilities.

HDFS 605 IMPACT OF AGING ON THE FAMILY 3
Psychological, physical and financial impact of aging persons on younger family members; increased dependence; family adjustment, both positive and conflicting.

HDFS 606 EARLY CHILD LITERACY SKILL DEV 3
Examines advanced research and theories addressing literacy development in Early Childhood education settings. Includes the application of instructional and assessment strategies helpful in promoting language and literacy of children from diverse backgrounds and/or learning needs.

HDFS 607 SEMINAR IN COMMUNITY DEVELOPMENT AND NONPROFIT LEADERSHIP 1
Overview of the philosophical and conceptual foundations of Community Development and the Nonprofit Sector, with a special focus on Leadership approaches that are utilized in both areas. Through a survey of policy topics such as housing, family support and poverty, and social and economic development, examines how each field approaches addressing these issues.
Crosslisted with UAPP607.

HDFS 608 POVERTY, NEIGHBORHOODS AND COMMUNITY DEVELOPMENT 3
Examines social science literature through which multidisciplinary analysts have described and explained poverty, analyzed neighborhoods, and categorized community development efforts. Focusing on the United States, particular attention is paid to analyses from 1960 to the present.
Crosslisted with UAPP608.

HDFS 609 DOMESTIC VIOLENCE SERVICES 3
Examines issues in providing services to families in which domestic violence is occurring. Multiple service systems are explored, with emphasis on service coordination, service gaps, and public policy.

HDFS 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.

HDFS 615 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.

HDFS 616 BOOKS FOR EARLY CHILDHOOD (INFANCY TO 8) 3
An in depth examination of children’s books and strategies for selecting and using books with children from infancy to age 8. Topics include ways to use books to support children’s emotional, social and language development, parent education and culturally appropriate books to support development and to prevent early learning difficulties.
HDFS 621  FAMILY STUDIES I: EMPIRICAL AND THEORETICAL PERSPECTIVES 3
Examines basic theories in family studies and trends affecting families at the macro level. Includes a survey of the empirical base of the field and covers issues relating to the interface of the family and society and trends in prevention, intervention, education and therapy.

HDFS 624  INTRODUCTION TO LEADERSHIP & DISABILITIES 3
Focus is on the relationship between leadership skills, personal leadership traits and the shift to person centered individualized services and supports for people with intellectual and developmental disabilities and their families.

HDFS 627  PARENTING THROUGH THE LIFESPAN 3
Applied focus on parenting styles, roles, issues and goals through the lifespan. Parent diversity, intergenerational relationships, developmental and acquired disabilities, and needs of children, adult children, extended family members, and parents are examined.

HDFS 630  FAMILY LIFE EDUCATION 3
Teaching methods to address family life education and issues in formal educational and community settings and designing quality curricula and pedagogy for support, prevention and empowerment-based experiences.

HDFS 637  PROGRAM PLANNING, ASSESSMENT AND EVALUATION 3
Methods of program planning, summative and formative evaluation and assessment including models, rationales and evaluation techniques as they relate to individual classrooms, educational programs and community settings.

HDFS 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.

HDFS 639  CURRICULUM METHODS AND ASSESSMENT 3
Curriculum, instruction and methods of accountability as they relate to educational programs in community and family service agencies. Includes curriculum development, assessment and developmentally appropriate practices with emphasis on integrating language and literacy, social science, mathematics, science, the arts and Family and Consumer Sciences.

HDFS 640  EARLY CHILDHOOD ADMINISTRATION, LEADERSHIP AND ADVOCACY 3
Organization, administration and evaluation of early childhood education programs including personnel, facilities, regulations, educational programming, curriculum, management and development. Includes strategies for leadership, professional development and advocacy.

HDFS 641  INFANTS, TODDLERS AND FAMILIES: DEVELOPMENT AND PROGRAMMING 3
Cognitive, social, emotional and motor development for children from conception to 36 months, with implications for family support and early care and educational programming. Field placement required.
PREREQ: HDFS621 and HDFS621.

HDFS 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.

HDFS 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.

HDFS 646  INFANT AND EARLY CHILDHOOD MENTAL HEALTH 3
Early diagnosis, early intervention, risk and protective factors, and prevention are emphasized. Theories of social, emotional, cognitive, language, and family development, healthy functioning, and psychopathology in infants, young children, and their families are reviewed.

HDFS 647  FAMILY PARTNERSHIPS IN EARLY CHILDHOOD CARE AND EDUCATION 3
Rationale and methods for developing partnerships between families and early care, education, and allied health professionals are examined. Collaboration between families and professionals is explored within the context of race, ethnicity, and diversity among families, and community/professional cultural and socio-political factors.

HDFS 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.

HDFS 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 the behavioral development of children and families through the life cycle.

HDFS 656  ADULT DEVELOPMENT AND LEARNING 3
Theory and current research on adult development and learning with emphasis on relationship-based, transformative and sustainable learning in early education, human services and higher education settings.

HDFS 658  READINGS IN INDIVIDUAL AND FAMILY STUDIES 3
Emphasis on either infancy, early and/or middle childhood, adolescence, adulthood, gerontology and/or specialized topics in family studies. Emphasis may vary by semester.

HDFS 660  TEACHING OF HUMAN DEVELOPMENT AND FAMILY STUDIES 1-6
Students acquire pedagogical strategies and techniques for effective teaching of human development and family studies at the post-secondary level, including observation, teaching opportunities and mentoring relationships with faculty.
RESTRICIONS: Requires permission of instructor.

HDFS 662  CURRICULUM ANALYSIS IN EARLY CHILDHOOD 3
Examination and evaluation of curriculum in early childhood including theoretical analysis of pedagogy, curriculum content and child outcomes.

HDFS 663  ATYPICAL INFANT AND TODDLER DEVELOPMENT 3
Detailed overview of atypical development of infants and toddlers including their sensory, motor, cognitive, communication, and psychosocial development. Family interactions, supports, and early intervention service systems are also addressed.

HDFS 665  PROFESSIONAL DEVELOP SEMINAR 1-6
Focuses on professional development for Masters and Doctoral level students. Topics range from job search preparation skills, interviewing, time/stress management, networking and career opportunities, and grantsmanship.

HDFS 668  RESEARCH 1-6

HDFS 669  SUPERVISED FIELD EXPERIENCE AND STUDY 1-12
Supervised work with children, adults and/or families in educational and/or community settings.
RESTRICIONS: Credit may be distributed over more than one semester.

HDFS 670  FAMILY RISK AND RESILIENCY 3
Applied focus on situations which place families at risk across the life span such as poverty, disability, stressors and family dissolution. An examination of family strengths, cultural diversity and techniques for working with families across the life course in community based settings including classrooms, programs, and agencies.

HDFS 691  PLAY AND HUMAN DEVELOPMENT 3
Play is an essential part of healthy human development. Examine the role of play in human development and education from diverse perspectives. Theories and research on play and its relationship to physical, cognitive, language, and socio-emotional development across human life span will be addressed.

HDFS 693  GROUP DYNAMICS 3
Theory, strategies and skills needed to work effectively with groups. Emphasis on understanding and managing the factors that affect group facilitation and leadership.
<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDFS 755</td>
<td>EVALUATION MODELS AND APPROACHES</td>
<td>Using a case-based approach, the course covers major evaluation models and approaches and their implications for evaluation planning, design, and use. Provides a foundation for thoughtful, credible, and ethical evaluation practice. Crosslisted with EVAL 755. PREREQ: HDFS637 or permission of instructor.</td>
<td>3</td>
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<tr>
<td>HDFS 756</td>
<td>ADVANCED SEMINAR IN EVALUATION</td>
<td>The seminar provides the opportunity to study selected areas of evaluation theory and practice in depth. Potential topics include mixed-method evaluation, culturally-responsive evaluation, systems theory for evaluation, evaluation in different sectors (public, private, nonprofit), and others. Crosslisted with EVAL 756. PREREQ: EVAL 755 or permission of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>HDFS 803</td>
<td>HUMAN DEVELOPMENT IN LIFE SPAN PERSPECTIVE</td>
<td>Systematic survey of developmental domains across the life span. Topical emphasis on multidisciplinary research findings chronicling continuities and discontinuities in individuals’ status and functioning in physical growth, perception, cognition, language, attachment, personality development, gender and sexuality. PREREQ: HDFS601 or permission of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>HDFS 815</td>
<td>RESEARCH ISSUES AND DESIGNS</td>
<td>Examination of issues in design, sampling, measurement and analysis techniques applicable to research in family studies. PREREQ: HDFS615.</td>
<td>3</td>
</tr>
<tr>
<td>HDFS 823</td>
<td>PROSEMINAR: SOCIAL AND URBAN POLICY</td>
<td>Social policy attempts to promote the well-being of individuals, families and communities through public action. Explores efforts to address social and economic problems in urban society. Considers differential policy impacts by social class, race/ethnicity, gender and age. Topics: welfare, housing, social security, health, education, criminal justice and employment. Crosslisted with UAPP823.</td>
<td>3</td>
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<tr>
<td>HDFS 828</td>
<td>TRENDS AND ISSUES IN HUMAN DEVELOPMENT AND FAMILY STUDIES</td>
<td>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.</td>
<td>3</td>
</tr>
<tr>
<td>HDFS 850</td>
<td>THEORIES: FAMILY STUDIES AND HUMAN DEVELOPMENT</td>
<td>Advanced analysis of theories of family studies and individual development, behavior and family life and applications to research models. Strong emphasis on historical and philosophical influences on theory building. The function of theory, the process of theory construction and critical components of specific theoretical perspectives examined. PREREQ: HDFS621 or permission of instructor.</td>
<td>3</td>
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<tr>
<td>HDFS 855</td>
<td>FAMILY STUDIES II: ANALYSIS AND CRITICAL ISSUES</td>
<td>A critical analysis of topics central to understanding the field of family studies. Emphasis on issues facing contemporary families. Topics include the work-family balance, marriage, divorce, remarriage, parenting, domestic violence, pregnancy, sibling relationships across the lifespan. PREREQ: HDFS621 or permission of instructor.</td>
<td>3</td>
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<tr>
<td>HDFS 860</td>
<td>DIVERSITY IN FAMILIES AND HUMAN DEVELOPMENT</td>
<td>Examines the effects of factors such as class, cohort, culture, gender and other components that influence diversity in families and variations in the context of human development. Surveys the impact of socioeconomic influences and demographic changes as they relate to varied family structures and relationships over the life course. PREREQ: HDFS601 or HDFS621, or permission of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>HDFS 865</td>
<td>ADVANCED SEMINAR IN FAMILY STUDIES</td>
<td>Varying special interest topics in family studies. Topics usually are presented from an interdisciplinary perspective. RESTRICTIONS: Requires permission of instructor. May be repeated for credit as topic varies.</td>
<td>1-3</td>
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<tr>
<td>HDFS 868</td>
<td>RESEARCH</td>
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<td>1-6</td>
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<tr>
<td>HDFS 869</td>
<td>MASTER’S THESIS</td>
<td></td>
<td>1-6</td>
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<tr>
<td>HDFS 870</td>
<td>PREVENTION INTERVENTION AND POLICY</td>
<td>Foundations of family crisis prevention and early intervention, including parenting and family support, empowerment, and community development. Exemplary interventions and policies for optimizing development are highlighted.</td>
<td>3</td>
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<tr>
<td>HDFS 875</td>
<td>INTERGENERATIONAL RELATIONSHIPS AND DEVELOPMENT</td>
<td>Focused consideration of the role of intergenerational relationships in the development of individuals and families. Intensive study of theories and empirical data illustrating the contextually embedded interactions of individual and family development. Particular emphasis on developmental reciprocity in child-parent-grandparent and extended family relationships. PREREQ: permission of instructor.</td>
<td>3</td>
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<tr>
<td>HDFS 880</td>
<td>FAMILIES, DISABILITIES AND INSTITUTIONS</td>
<td>Focuses on how families and individuals with disabilities interface with a range of institutions such as the legal system, social services, educational and health care systems. Discusses effects of institutions on families and influence of families on institutional policies and processes.</td>
<td>3</td>
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<tr>
<td>HDFS 885</td>
<td>ADOLESCENT PROBLEM BEHAVIORS</td>
<td>Explores adolescent problem behaviors from a developmental perspective. Substance abuse, early pregnancy/childbearing, anxiety, depression, eating disorders and other issues will be examined. Discuss intervention and prevention programs targeting adolescent problem behaviors.</td>
<td>3</td>
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<tr>
<td>HDFS 964</td>
<td>PRE-CANDIDACY STUDY</td>
<td>Research and readings in preparation of dissertation topics and/or qualifying examinations for doctoral students before admission to candidacy but after completion of all required course work. RESTRICTIONS: Not open to students who have been admitted to candidacy.</td>
<td>3-12 PF</td>
</tr>
<tr>
<td>HDFS 969</td>
<td>DOCTORAL DISSERTATION</td>
<td></td>
<td>1-12 PF</td>
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</tbody>
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**HEBREW**

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<tr>
<th>Course Code</th>
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<th>Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEBR 105</td>
<td>HEBREW I - ELEMENTARY</td>
<td>Introduction to the Hebrew alphabet and language, and development of basic speaking, listening, and writing skills. May be crosslisted with JWST105.</td>
<td>4</td>
</tr>
<tr>
<td>HEBR 106</td>
<td>HEBREW II - ELEMENTARY/INTERMEDIATE</td>
<td>Continuation of Elementary Hebrew. Increasing mastery of the basic skills of speaking, listening, reading, and writing through texts, conversations and songs. May be crosslisted with JWST106. PREREQ: HEBR105. Those with background other than HEBR105 should see instructor for appropriate placement.</td>
<td>4</td>
</tr>
<tr>
<td>HEBR 107</td>
<td>HEBREW III - INTERMEDIATE</td>
<td>Strengthening grammar skills, continued practice in speaking, listening, writing and reading through conversation, texts and songs. May be crosslisted with JWST107. PREREQ: HEBR106. Those with background other than HEBR106 should see instructor for appropriate placement RESTRICTIONS: Satisfies College of Arts and Sciences language requirement.</td>
<td>4</td>
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<tr>
<td>HEBR 205</td>
<td>HEBREW CONVERSATION</td>
<td>Practical use of Hebrew by means of discussions and oral reports on a variety of topics including family, school and work life. Emphasis on improvement of conversational skills for social situations, as well as grammatical competence and reading comprehension through multicultural themes including the revival of the Hebrew language and various issues related to Hebrew culture. May be crosslisted with JWST205. PREREQ: HEBR107 or equivalent</td>
<td>3</td>
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<tr>
<td>HEBR 208</td>
<td>TEL AVIV AND JERUSALEM THROUGH TIME</td>
<td>A cultural comparison of Tel Aviv and Jerusalem. Tel Aviv and Jerusalem represent different aspects and faces of Israeli society. Our exploration of the two cities will unravel the histories of these cities, while at the same time, look at their present structural, cultural, and social components. May be crosslisted with JWST207.</td>
<td>3</td>
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<tr>
<td>HEBR 209</td>
<td>CONTEMPORARY ISRAEL THROUGH FILM</td>
<td>Development of oral and written proficiency in Hebrew through discussion and analysis of Israeli films pertaining to major issues in the development of the young state. Grammar review where needed. May be crosslisted with JWST209. PREREQ: HEBR107 or one 200-level Hebrew course or professor’s permission. RESTRICTIONS: Minimum grade of A- required for HEBR107 and minimum grade of B required for a 200-level course.</td>
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<tr>
<td>HEBR 366</td>
<td>INDEPENDENT STUDY</td>
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<td>HEBR 466</td>
<td>INDEPENDENT STUDY</td>
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<tr>
<td>HEBR 666</td>
<td>SPECIAL PROBLEM</td>
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<tr>
<td>HIST 101</td>
<td>WESTERN CIVILIZATION TO 1648</td>
<td>3</td>
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<tr>
<td>HIST 102</td>
<td>WESTERN CIVILIZATION: 1648 TO THE PRESENT</td>
<td>3</td>
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<tr>
<td>HIST 103</td>
<td>WORLD HISTORY I</td>
<td>3</td>
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<td>HIST 104</td>
<td>WORLD HISTORY II</td>
<td>3</td>
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<td>HIST 130</td>
<td>ISLAMIC NEAR EAST: 600-1500</td>
<td>3</td>
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<td>HIST 131</td>
<td>ISLAMIC NEAR EAST: 1500-PRESENT</td>
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<td>HIST 134</td>
<td>HISTORY OF AFRICA</td>
<td>3</td>
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<td>HIST 135</td>
<td>INTRODUCTION TO LATIN AMERICAN HISTORY</td>
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<td>HIST 136</td>
<td>TOPICS IN EAST ASIA IN FILM</td>
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<td>HIST 137</td>
<td>EAST ASIAN CIVILIZATION: CHINA</td>
<td>3</td>
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<td>HIST 138</td>
<td>EAST ASIAN CIVILIZATION: JAPAN</td>
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<td>HIST 145</td>
<td>GANDHI'S INDIA</td>
<td>3</td>
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<td>HIST 146</td>
<td>INTRODUCTION TO JEWISH CULTURE AND HISTORY</td>
<td>3</td>
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<td>HIST 150</td>
<td>GREAT IDEAS</td>
<td>3</td>
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<td>HIST 152</td>
<td>AMERICAN APOCALYPSE: THE CIVIL WAR</td>
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<td>HIST 156</td>
<td>THE SURPRISING AND FASCINATING STORY OF AMERICAN SEXUALITIES</td>
<td>3</td>
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<td>HIST 170</td>
<td>PLAGUES AND PEOPLES IN HUMAN HISTORY</td>
<td>3</td>
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<td>HIST 178</td>
<td>THE WORLD ON A SHIP, 1500-1800</td>
<td>3</td>
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<td>HIST 180</td>
<td>REVOLUTIONS AND SOCIAL JUSTICE</td>
<td>3</td>
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<td>HIST 190</td>
<td>HISTORY OF THE FUTURE</td>
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<td>HIST 200</td>
<td>HISTORY AND GOVERNMENT OF DELAWARE</td>
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<td>HIST 201</td>
<td>INTRODUCTION TO GLOBAL ISLAM</td>
<td>3</td>
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<td>HIST 205</td>
<td>U.S. HISTORY TO 1865</td>
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<td>HIST 206</td>
<td>U.S. HISTORY SINCE 1865</td>
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**RESTRICTIONS:**


**Course Descriptions:**

- **HIST 101**: 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**: The principal political, social, economic, and cultural developments in Western civilization since the middle of the 17th century.
- **HIST 103**: Principal political, economic, social, and cultural developments in world history through the 16th century, relating the past to the present. Equal weight given to the history of Asia, Africa, the Americas, and Europe.
- **HIST 104**: Principal political, economic, social, and cultural developments in world history from the 16th century to the present, relating the past to the present. Equal weight given to the history of Asia, Africa, the Americas, and Europe.
- **HIST 130**: Introduces the origins of Islam, its development as a religion and a culture, and the broad trends in Middle Eastern history until 1500.
- **HIST 131**: Considers the traditional make-up of the Middle East and charts the emergence of the region in its present form through the 19th and 20th centuries.
- **HIST 134**: Introduction to 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 BAMS134.
- **HIST 135**: Introduction to Latin American history from preconquest period to present.
- **HIST 136**: Explores East Asian cinema and society via readings, discussion and viewing of films by and/or about East Asians. Topics vary. Crosslisted with EAST136. **Restrictions:** May be repeated for credit when topics vary.
- **HIST 137**: A survey of major aspects of Chinese civilization, relating the past to the present.
- **HIST 138**: A survey of major aspects of Japanese civilization, relating the past to the present.
- **HIST 145**: Introduction to Mohandas Gandhi’s profound contribution to India’s independence; to his strategies for peaceful struggle and to his criticism of “modern society.” Other prominent leaders and organizations that held radically different views about modern India will be examined.
- **HIST 146**: Focus on Jewish history from the Biblical period to the present. Study the origins of a group of people who call themselves, and whom others call, Jews. Focus on place, movement, power/powerlessness, gender, and question of how to define Jews over time and place. Explores Jews as a group of people bound together by a particular set of laws; looks at their dispersion and diversity; explores Jews’ interactions with surrounding cultures and societies; introduces the basic library of Jews; sees how Jews relate to political power. May be crosslisted with JWST146.
- **HIST 150**: Explores the great questions of human history. It juxtaposes East with West and global North with the South as it examines how people have built up—and torn down—human civilization over time. **Restrictions:** May be repeated one time for credit.
- **HIST 152**: American Apocalypse explores the causes, character, and consequences of the Civil War. We will begin by investigating the deepening estrangement of North and South in the 1830s and 1840s and the pivotal role played by slavery in that process of alienation. Our attention turns next to the decade of the 1850s and the series of crises that propelled the South toward secession in 1861. A consideration of the fighting itself and the impact of military conflict on the Confederacy and Union homefronts will follow.
- **HIST 156**: Learn about the history of American sexuality and its importance to our politics and culture today. We will examine a variety of topics: the history of marriage and the family, pregnancy and childbirth, contraception, abortion, rape, prostitution, erotica/pornography, sexual reform and c/cultural purity, movements, sexuality and racial conflicts, sex during wartime, transsexuality, same-sex desires and communities, the sexual politics of women’s emancipation, sexual diseases, sex education, sexual liberation, and the gay rights movement. May be crosslisted with SGST156, WOMS156.
- **HIST 170**: Death stalks us all. Using William McNeill’s classic “Plagues and Peoples in History,” this course will examine and effects of major epidemics and diseases in human history (e.g., plague, smallpox, measles, typhus, AIDS, and the like), including how both professionals and ordinary people sought to explain and deal with these rampaging maladies.
- **HIST 178**: Introduction to a wide variety of cultures and economies during the era of Europe’s empire-building, the rise of the slave trade, the blending of peoples in the western hemisphere, the transformation of consuming and producing patterns across the entire Atlantic world, and more. Trace the origins, rise, and revolutionary eras of these empires and the indigenous peoples whom these empires transformed.
- **HIST 180**: What is government? What is freedom? What is equal opportunity? When is revolution justified? This course examines the struggle to attain social and political justice in the modern era, from seventeenth-century civil wars to current struggles over economic inequity, civic rights, and political power.
- **HIST 190**: How have scientists, engineers, and technological visionaries imagined the future? How do films and other forms of popular culture, such as comic books, fiction, and television, reveal society’s hopes and anxieties about those visions? Weekly film showings, lectures, readings, and other class activities to explore these fascinating questions.
- **HIST 200**: A survey of the history of Delaware and its present government, with special attention to the needs of social studies teachers.
- **HIST 201**: Introduction to philosophy and history of Islam. Provides basic introduction to Quran, Traditions of Prophet Muhammad, and fundamentals of Islamic law and jurisprudence. Explores different interpretations and manifestations of Islam, both historically and contemporaneously. Surveys rapid globalization of Islam and Muslim communities.
- **HIST 205**: Introduction to the history, operations and future of museums, historic sites, archives and related cultural organizations. Examines collecting and collection management, conservation of collections, exhibition development, public programs and museum education, and digital outreach. Museum careers and volunteer engagement are explored. Crosslisted with MSST203.
- **HIST 206**: An introductory survey of 17th, 18th, and 19th-century American history. Themes and approach vary with the instructor.
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<tbody>
<tr>
<td>HIST 210</td>
<td>Introduction to Military History</td>
<td>3</td>
<td>Survey of the history of warfare from the ancient Greeks through World War I, with emphasis upon tactics, weapons, armor, strategy and the human factors that contributed to success or failure in war.</td>
</tr>
<tr>
<td>HIST 216</td>
<td>Introduction to Material Culture Studies</td>
<td>3</td>
<td>Introduces students to material culture studies, broadly defined as study of all things people make and all the ways people have altered the physical world. Explores the approaches, concepts, and methods of numerous disciplines that investigate material culture. Cроссlisted with ANTH216.</td>
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<tr>
<td>HIST 220</td>
<td>The Civil Rights Movement</td>
<td>3-4</td>
<td>This course examines African American struggles for freedom, equality, and citizenship from the 1940s to the present. Cроссlisted with BAM5220.</td>
</tr>
<tr>
<td>HIST 221</td>
<td>Film and American Society</td>
<td>3</td>
<td>Examines how American political, social and cultural beliefs found expression in American feature films from World War II through the 1990s. Weekly lectures and classic films such as On the Waterfront, Dr. Strangelove, Bonnie and Clyde, others.</td>
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<tr>
<td>HIST 222</td>
<td>Religion in Modern America</td>
<td>3</td>
<td>Surveys major themes in American religious history since the Civil War, including religion and social reform, politics, popular culture, and everyday life. May be crosslisted with JWST222.</td>
</tr>
<tr>
<td>HIST 223</td>
<td>Nature and History</td>
<td>3</td>
<td>Survey of how people across the globe have related to the non-human world roughly in the last 10,000 years. Focuses on revolutionary changes in global environmental history as well as efforts in many times and places to solve environmental problems.</td>
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<tr>
<td>HIST 241</td>
<td>History of Christianity to 1300</td>
<td>3</td>
<td>A survey of the evolution of Christianity from its origins to 1300.</td>
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<tr>
<td>HIST 243</td>
<td>Ancient Religion and Civilization</td>
<td>3</td>
<td>Outlines religion in Europe and the Near East from the Paleolithic period to the rise of Islam. Covers religious beliefs, rituals, death and burial practices of ancient man and construction and use of religious edifices.</td>
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<tr>
<td>HIST 250</td>
<td>Comparative Genocide</td>
<td>3</td>
<td>Examines genocidal acts in the 20th century in a comparative framework. Cases include genocides of Armenians, Jews, Cambodians, Bosnians, and Rwandans. Topics include political and racial ideology, government institutions, perpetrator motivations, international responses, and genocide prevention. May be crosslisted with JWST250.</td>
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<tr>
<td>HIST 254</td>
<td>Jewish Holocaust: 1933-1945</td>
<td>3</td>
<td>Focuses on the infamous &quot;Final Solution,&quot; with particular emphasis on the roots of Anti-Semitism, National Socialist policies and plans, ghetto and camp life, the Einsatzgruppen, resistance, the politics of rescue and the art and literature of the Holocaust. May be crosslisted with JWST254.</td>
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<tr>
<td>HIST 268</td>
<td>Seminar</td>
<td>3</td>
<td>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. Cannot be repeated for credit.</td>
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<tr>
<td>HIST 270</td>
<td>History of Modern Asia</td>
<td>3</td>
<td>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, nationalistic and communist movements, Pacific War, cultural revolution in China, Vietnam Conflict and emergence of the Japanese economic powerhouse.</td>
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<tr>
<td>HIST 291</td>
<td>Women's History Through Film</td>
<td>1</td>
<td>Explores women's historical experiences through the medium of film. Students will view and discuss a variety of documentary films on women and read materials related to topics covered in the films. Films will deal with historical and contemporary issues in the United States and internationally. Cроссlisted with WOMS291. RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>HIST 300</td>
<td>Women in American History</td>
<td>3</td>
<td>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.</td>
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<tr>
<td>HIST 302</td>
<td>The World in Our Time</td>
<td>3</td>
<td>An examination of current events within the context of historical forces.</td>
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<tr>
<td>HIST 305</td>
<td>Race, Image, in Media/Culture</td>
<td>3</td>
<td>Study how images shape and reflect attitudes toward race and ethnicity in culture. Visual materials include film, photography, television, and popular illustrations. Cроссlisted with BAM505.</td>
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<tr>
<td>HIST 307</td>
<td>The U.S. in the Early National Period, 1789-1825</td>
<td>3</td>
<td>Political and cultural change in America from 1789 to 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.</td>
</tr>
<tr>
<td>HIST 308</td>
<td>The United States in the Antebellum Period, 1825-1861</td>
<td>3</td>
<td>Social transformation and politics in America from 1825 to the eve of the Civil War. Particular attention to the presidency of Andrew Jackson, changes in institutions and culture related to expansion, and conflicts leading to disunion.</td>
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<tr>
<td>HIST 311</td>
<td>Postwar America II: 1963-Present</td>
<td>3</td>
<td>Social, political and diplomatic history of the United States from 1963 to the present.</td>
</tr>
<tr>
<td>HIST 312</td>
<td>History of Crime and Criminal Justice</td>
<td>3</td>
<td>Examines changing perceptions of criminal and deviant behavior and development of laws, institutions, and social policies to counteract crime from seventeenth century to present. Cроссlisted with CRJU312.</td>
</tr>
<tr>
<td>HIST 313</td>
<td>The United States, 1877-1914</td>
<td>3</td>
<td>Examines the rise of big business after the Civil War and societal responses to industrialism. Describes and assesses topics including race relations, immigration, and politics.</td>
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<tr>
<td>HIST 314</td>
<td>The United States, 1914-1945</td>
<td>3</td>
<td>Examines United States history from 1914 - 1945 and focuses on three topics: 1) the causes and consequences of American intervention in the two world wars; 2) social and cultural change during the 1920s; and 3) the age of the Great Depression and New Deal.</td>
</tr>
<tr>
<td>HIST 315</td>
<td>History for Teachers</td>
<td>3</td>
<td>Focus on conceptualizing content for teaching. Students will extract key concepts, essential questions, objectives, and relevant themes that would provide the conceptual framework for teaching. They will also be encouraged to connect contemporary issues to past issues and events in history. RESTRICTIONS: Must be either a Secondary Education or Elementary Education major.</td>
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<tr>
<td>HIST 317</td>
<td>Buying In: Consumer Capitalism in the US</td>
<td>3</td>
<td>Explores the origins and development of consumer capitalism in the US, with special emphasis on advertising, department stores, and mass media.</td>
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<tr>
<td>HIST 318</td>
<td>Colonial America</td>
<td>3</td>
<td>The transit of culture from England to America and its modification there during the seventeenth century. The development of mature colonial societies to 1760.</td>
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<td>Course Code</td>
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<tr>
<td>HIST 319</td>
<td>REVOLUTIONARY AMERICA, 1760-1789</td>
<td>3</td>
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<td></td>
<td>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.</td>
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<tr>
<td>HIST 320</td>
<td>SLAVE NARRATIVES IN THE AFRICAN DIASPORA</td>
<td>3</td>
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<td>Examines the institution of slavery in the Americas through the perspective of the slaves who endured it. Letters, speeches, interviews and narratives will be examined within the historical context of 18th and 19th century slave society. The goal of the course is to 1) gain a deeper understanding of the slave experience from the slave's point of view, 2) examine the historical dimensions of slave testimony and its use as historical evidence, and 3) understand the gendered, regional, period and spatial nuances of the slave experience. Crosslisted with BAMS369.</td>
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<td>HIST 321</td>
<td>CIVIL WAR AND RECONSTRUCTION</td>
<td>3</td>
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<td></td>
<td>Sectional conflict and the struggle between rival nationalisms in mid-19th century United States.</td>
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<td>HIST 322</td>
<td>THE OLD SOUTH</td>
<td>3</td>
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<td></td>
<td>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.</td>
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<tr>
<td>HIST 324</td>
<td>AMERICAN CONSTITUTIONAL HISTORY</td>
<td>3</td>
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<td>A survey of constitutionalism in the U.S. from the American Revolution to the present, emphasizing these broad areas of constitutional change: the balance of power between the federal government and the states, the Supreme Court's exercise of judicial review, the growth of presidential power, and the scope of civil rights and civil liberties. Crosslisted with CRJU324.</td>
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<td>HIST 325</td>
<td>AFRICAN AMERICAN HISTORY TO THE CIVIL WAR</td>
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<td></td>
<td>The history of African American life and culture to the Civil War. Crosslisted with BAMS304.</td>
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<tr>
<td>HIST 326</td>
<td>AFRICAN AMERICAN HISTORY SINCE THE CIVIL WAR</td>
<td>3</td>
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<td>Provides an overview of the major themes, issues, and debates in African American History from the Civil War to the contemporary era. Through readings, lectures, discussions, film, the course will address: the process of emancipation, Reconstruction, Jim Crow segregation and racial violence, black cultural production, the modern black freedom struggles, and black life in the 21st century. Crosslisted with BAMS306.</td>
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<tr>
<td>HIST 327</td>
<td>TOPICS IN JEWISH HISTORY</td>
<td>3</td>
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<td>Introductory courses on focused topics in the history of Jewish people from ancient to modern times. Course topics explore the development of religion, culture, politics, and demography of Jews throughout the Diaspora and in modern Israel. May be crosslisted with JWST327.</td>
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<tr>
<td>HIST 328</td>
<td>AMERICAN CAPITALISM SINCE 1815</td>
<td>3</td>
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<td>An examination of the development of modern American industrial capitalism and its most important economic, political, and social influences on American society. Topics included: technological change; the roles of business structure, labor, and reform; management theory and practice; social protest and alienation; race relations in the context of labor and capital; gender roles and family life; and advertising and consumerism.</td>
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<tr>
<td>HIST 329</td>
<td>INTERNATIONAL MIGRATION</td>
<td>3</td>
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<td>Interdisciplinary introduction to alternative/complementary disciplinary approaches to the study of human movement between states. Offered on a rotational basis by faculty involved in the University of Delaware migration group. Crosslisted with POSC329.</td>
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<tr>
<td>HIST 331</td>
<td>HISTORY OF CARIBBEAN I</td>
<td>3</td>
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<td>Examines major themes in Caribbean history from the pre-Columbian period to the end of slavery in 1838. Discussion of the demographic and ecological consequences of European contact, sugar and slavery, the evolution of Creole cultures and slave resistance. May be crosslisted with BAMS331.</td>
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<tr>
<td>HIST 332</td>
<td>HISTORY OF CARIBBEAN II</td>
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<td>Examines the period from 1838 to the present. Includes a discussion of the social and economic adjustments to emancipation, the making of plural societies with the importation of Asian laborers, American imperialism and political and social movements of the twentieth century. May be crosslisted with BAMS332.</td>
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<td>HIST 334</td>
<td>AFRICAN AMERICAN WOMEN’S HISTORY</td>
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<td>Explores the diversity of African American women's lives and development of women, work, and culture from the colonial era through the late 20th century. Examines the social, political, religious and economic factors affecting change and transformation in the lives of African American women. Provides a broad introduction to the interdisciplinary field of African American and Women's Studies. May be crosslisted with BAMS334, WOMS334.</td>
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<tr>
<td>HIST 335</td>
<td>AMERICAN SLAVERY</td>
<td>3</td>
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<td>In this class we will examine the institution of slavery from 1619 through the Civil War. This course has a number of goals, one of which is to examine the peculiar institution over space and time within colonial and antebellum America. May be crosslisted with BAMS336.</td>
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<td>HIST 336</td>
<td>TOPICS IN LATIN AMERICAN HISTORY</td>
<td>3</td>
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<td></td>
<td>History and culture of Latin American peoples. May be taken for up to 12 credits when topics vary.</td>
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<td>HIST 337</td>
<td>TOPICS IN AMERICAN HISTORY</td>
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<td>Course topics vary and may be chronologically or thematically based. Examples include “America in the 1920s” and “American Sports History.” May be repeated for credit when topics vary.</td>
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<td>HIST 338</td>
<td>GREEK-ROMAN SPORT-RECREATION</td>
<td>3</td>
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<td>Covers period 2000 B.C. to 6th century A.D. from point of view of spectator and participant; use of ancient authors in translation, artistic representations and secondary literature. Extensive use of slides.</td>
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<td>HIST 339</td>
<td>TOPICS IN EUROPESE HISTORY</td>
<td>3</td>
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<td>Explores the political, social, cultural, and economic history of Europe, with a focus or theme that touches on one or more countries. The emphasis when taught in Newark is on particular aspects of European history distinct from national narratives. The syllabi are typically complemented by visits to museums and appropriate historic sites when taught abroad. Topics vary but often focus on a sweeping historical survey of the particular European country in which a Study Abroad program is taking place.</td>
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<td>HIST 340</td>
<td>ANCIENT NEAR EAST AND GREECE</td>
<td>3</td>
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<td>Stresses such themes as the way in which the world view of the ancients was different from ours, and the relationship between the individual and society. Readings in ancient historical works and ancient literature. Extensive use of slides.</td>
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<td>HIST 341</td>
<td>ANCIENT ROME</td>
<td>3</td>
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<td>Students are encouraged to form opinions on such questions as why and how Rome came to rule its empire; why Julius Caesar was murdered; and why Augustus succeeded where Julius Caesar had failed. Readings in ancient sources. Extensive use of slides.</td>
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<td>HIST 342</td>
<td>BARBARIAN EUROPE</td>
<td>3</td>
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<tr>
<td></td>
<td>A survey of political, social, cultural and economic developments in Europe between 300 and 1050.</td>
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<td>HIST 343</td>
<td>MEDIEVAL EUROPE: 1050-1350</td>
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<td></td>
<td>A survey of political, social, cultural and economic developments in Europe between 1050 and 1350.</td>
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<td>HIST 344</td>
<td>RENAISSANCE EUROPE</td>
<td>3</td>
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<td></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>
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<td>HIST 345</td>
<td>REFORMATION EUROPE</td>
<td>3</td>
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<td>Religion in the realms of thought and action during the rise of early modern Western civilization: the witch-craze, the scientific revolution, the Reformation, the Counter-Reformation and their impact on the behavior and perceptions of people by 1650.</td>
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<td>HIST 348</td>
<td>HISTORY OF SPAIN: 1479-PRESENT</td>
<td>3</td>
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<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>
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<td>HIST 349</td>
<td>MODERN LATIN AMERICA: 1800-PRESENT</td>
<td>3</td>
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<tr>
<td>HIST 350</td>
<td>WORLD WAR II IN EUROPE, 1939-1945</td>
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<td>HIST 351</td>
<td>EUROPE IN CRISIS: 1919-1945</td>
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<td>HIST 352</td>
<td>EUROPE, 1945 TO THE PRESENT</td>
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<td>HIST 353</td>
<td>MODERN GERMANY: 1770-1919</td>
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<td>HIST 354</td>
<td>GERMANY IN THE TWENTIETH CENTURY: 1914 TO PRESENT</td>
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<td>HIST 355</td>
<td>EARLY MODERN INTELLECTUAL HISTORY</td>
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<td>HIST 356</td>
<td>MODERN EUROPEAN INTELLECTUAL HISTORY</td>
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<td>HIST 357</td>
<td>THE EUROPEAN CITY</td>
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<td>HIST 359</td>
<td>SOVIET UNION: 1917-1991</td>
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<td>HIST 361</td>
<td>TWENTIETH CENTURY FRANCE</td>
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<td>HIST 363</td>
<td>MODERN JEWISH HISTORY</td>
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<td>HIST 365</td>
<td>TOPICS IN ASIAN AND PACIFIC HISTORY</td>
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<tr>
<td>HIST 366</td>
<td>INDEPENDENT STUDY</td>
<td>1-6</td>
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<tr>
<td>HIST 368</td>
<td>MODERN CHINA: 1600s TO PRESENT</td>
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<td>HIST 369</td>
<td>CHINA SINCE 1949</td>
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<td>HIST 370</td>
<td>HISTORY OF MODERN JAPAN</td>
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<td>HIST 371</td>
<td>POSTWAR JAPAN</td>
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<td>HIST 372</td>
<td>JAPAN’S GLOBAL POP CULTURE</td>
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<td>HIST 373</td>
<td>MODERN IRELAND: 1660-PRESENT</td>
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<td>HIST 374</td>
<td>HISTORY OF ENGLAND TO 1688</td>
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<td>HIST 375</td>
<td>BRITAIN SINCE 1714</td>
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<td>HIST 376</td>
<td>ENGLAND: THE FORMATIVE YEARS, 1648-1798</td>
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<td>HIST 377</td>
<td>RADICALISM AND REVOLUTION: ISLAMIC MOVEMENT/MODERN MIDDLE EAST</td>
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<td>HIST 378</td>
<td>FAMILY, TRIBE AND NATION: IDENTITY IN THE MODERN MIDDLE EAST</td>
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<tr>
<td>HIST 379</td>
<td>HISTORICAL ARCHAEOLOGY OF THE EASTERN UNITED STATES</td>
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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
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<tbody>
<tr>
<td>HIST 380</td>
<td>HISTORY OF THE ARAB-ISRAELI CONFLICT</td>
<td>3</td>
<td>Explores the roots and the historical complexity of the Arab-Israeli conflict. Topics include: the origins of Zionism, the nature of traditional Arab/Ottoman society in the 19th century, the relationship between the early Zionists and indigenous Arab populations of Palestine, the foundation of a Jewish national identity, the rise of Palestinian nationalism, and the protracted search for coexistence between Jews and Arabs. May be crosslisted with JWST381.</td>
</tr>
<tr>
<td>HIST 381</td>
<td>ISLAM AND THE WEST: THE HISTORY OF MUTUAL PERCEPTIONS</td>
<td>3</td>
<td>Surveys the history of mutual views of Islam and Christianity/Judaism/the West from the Middle Ages to the present. Topics include medieval polemics, Enlightenment attempts at respect and understanding the question of Orientalism, and the current specter of a clash of civilizations.</td>
</tr>
<tr>
<td>HIST 382</td>
<td>HISTORY OF WESTERN MEDICINE</td>
<td>3</td>
<td>Social and cultural forces that have influenced the development of modern medicine.</td>
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<tr>
<td>HIST 384</td>
<td>EARLY IRISH HISTORY: FROM STRONGBOW TO CROMWELL, 1169-1659</td>
<td>3</td>
<td>Reviews Irish and English sources to examine the cultural differences that underlay the conflict in Ireland. The distinction between pastoral and agricultural societies will be used to examine the civilizing process, the justification of dispossession, and the origins of colonialism.</td>
</tr>
<tr>
<td>HIST 385</td>
<td>HISTORY BEHIND THE SCENES</td>
<td>1-6</td>
<td>Explore how history is presented to public audiences in a variety of settings (museums and historic sites, archives, public gardens) and media (documentaries, digital media). Field trips and discussion with professionals. Topics may also include art history, historical anthropology and natural history. May be crosslisted with MSST385. RESTRICTIONS: Departmental permission.</td>
</tr>
<tr>
<td>HIST 386</td>
<td>ASIAN AMERICA: CULTURE AND HISTORY</td>
<td>3</td>
<td>Explores the literature, culture and history of Asian Americans and immigrants to the United States variously using fiction, drama, poetry, documentary, photography, narrative film, drama, court cases, primary and secondary historical materials. Patterns of Asian immigration, anti-Asian violence and interment, Asian American resistance in litigation, legislation, and cultural activities, from Gold Rush to globalization. Crosslisted with ENGL386.</td>
</tr>
<tr>
<td>HIST 387</td>
<td>HISTORY OF SEXUALITY IN THE U.S.</td>
<td>3</td>
<td>A survey of American sexual ideals, practices, and identities, from the Colonial period to the present. How anxieties about interracial sex shaped life in the American South, how the advent of more reliable contraceptives provoked both social movements and political debate, and how the emergence of a scientific discourse of sexual difference simultaneously propelled the gay rights movement and enabled scientists to categorize same-sex love as pathology and perversion. May be crosslisted with SGST387, WOMS387.</td>
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<tr>
<td>HIST 388</td>
<td>AMERICAN INDIAN HISTORY</td>
<td>3</td>
<td>Topics vary and may include Indians in American History, American Indian History through Biography, American Indian Women's History. RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>HIST 389</td>
<td>THE AMERICAN WEST</td>
<td>3</td>
<td>Surveys the American West through the eyes of its diverse population as well as those who are drawn to study and define it. Particular attention given to themes currently debated concerning the legacy, meaning and imagery of the American West.</td>
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<tr>
<td>HIST 390</td>
<td>AMERICAN INDIANS: THE SOUTHWEST</td>
<td>3</td>
<td>Addresses the history of Indians in the American Southwest from pre-European contact to the present. Approaches the subject from multiple disciplinary and cultural perspectives and focuses on the histories of the “Pueblo,” Hopi, Apache and Navajo people.</td>
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<tr>
<td>HIST 392</td>
<td>BRAZIL IN THE MODERN WORLD</td>
<td>3</td>
<td>Focuses on the social and political history of Brazil over five hundred years, from first indigenous contact with Europeans through independence, formation of the Republic, modernization and contemporary issues facing the country. Ends by examining Brazil's changing place on the global stage. May be crosslisted with BAM5392.</td>
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<tr>
<td>HIST 393</td>
<td>HISTORY OF MODERN VIETNAM</td>
<td>3</td>
<td>Covers major social, cultural, political, economic and military developments in Vietnamese history from approximately 1500 to the present, including traditional civilization, colonization, nationalism and communism, the Indochina Wars (among them the &quot;Vietnam Conflict&quot;), the Kampuchean Crisis, and life under the Socialist Republic of Vietnam since 1976.</td>
</tr>
<tr>
<td>HIST 395</td>
<td>PAN AFRICANISM</td>
<td>3</td>
<td>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, the rise of Palestinian nationalism, and the protracted search for coexistence between Jews and Arabs. May be crosslisted with BAM5395.</td>
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<tr>
<td>HIST 397</td>
<td>HISTORY OF SOUTH AFRICA</td>
<td>3</td>
<td>Surveys the complex historical development of South African society. Topics include African resistance to white expansion, wars of resistance, the impact of agricultural and labor laws on African societies, tensions in white society, Africanizers in power since 1948, and African struggles for freedom. May be crosslisted with BAM5397.</td>
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<tr>
<td>HIST 398</td>
<td>TOPICS IN MEDIEVAL HISTORY</td>
<td>3</td>
<td>Course topics vary and may be chronologically or thematically based. Examples include &quot;Christians &amp; Muslims in the Middle Ages&quot; and &quot;Germany in the Middle Ages.&quot; May be repeated for credit when topics vary. Crosslisted with JWST398.</td>
</tr>
<tr>
<td>HIST 399</td>
<td>VARYING AUTHORS, THEMES, AND MOVEMENTS</td>
<td>3</td>
<td>Cultural, especially cross-cultural, study with primary emphasis on the historical development of the announced area, e.g., The Faust Theme in Western Literature, Dante Through the Ages, Don Juan, and the Transformation of a Myth. See <a href="http://primus.nss.udel.edu/CourseSearch/">http://primus.nss.udel.edu/CourseSearch/</a> for topics. RESTRICTIONS: May be repeated three times for credit when topics vary.</td>
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<tr>
<td>HIST 408</td>
<td>PUBLIC HISTORY: RESEARCH, RESOURCES AND PRACTICE</td>
<td>3</td>
<td>Team-taught seminar that acquaints students with the function and resources of American historical organizations and how to use these resources in the non-academic setting for productive historical research. Addressed to those pursuing careers in public history and teaching and scholarship. May be crosslisted with MSST408.</td>
</tr>
<tr>
<td>HIST 411</td>
<td>SEMINAR IN AMERICAN HISTORY</td>
<td>3</td>
<td>Topics vary. Recent topics include Jefferson and His Time, Women in 20th-Century America, The Nightmare Years: The U.S. 1960 to 1980, American Religious History and Conservatism in Recent America. May be crosslisted with WOMS411. PREREQ: HIST268 RESTRICTIONS: Majors only, or permission of instructor.</td>
</tr>
<tr>
<td>HIST 439</td>
<td>WOMEN AND REVOLUTION IN AFRICA</td>
<td>3</td>
<td>Discusses the critical roles played by women in African revolutionary movements. Why did women join these revolutionary movements? What is the relationship between feminism and revolution? May be crosslisted with WOMS439. PREREQ: HIST268. RESTRICTIONS: Majors only, or permission of instructor.</td>
</tr>
<tr>
<td>HIST 440</td>
<td>SEMINAR IN AFRICA UNDER COLONIAL RULE</td>
<td>3</td>
<td>Introduces various colonial policies of the European powers in Africa, emphasizing the comparisons and contrasts among these policies. Attention paid to the effect of Colonialism on Africa's economic, social and political development. PREREQ: HIST268. RESTRICTIONS: Majors only, or permission of instructor.</td>
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<tr>
<td>HIST 444</td>
<td>SEMINAR: WOMEN IN THE ISLAMIC MIDDLE EAST</td>
<td>3</td>
<td>Examines the major developments, themes and problems in women's history in the Middle East from the advent of Islam to the present. By tracing women’s legal status, sexual morality, family and social life, and female economic and political participation, it seeks to shed light on the process of women's roles in society and to challenge the notion that gender divisions and roles have been static over time. May be crosslisted with WOMS444. PREREQ: HIST268 RESTRICTIONS: Majors only, or permission of instructor.</td>
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<tr>
<td>HIST 463</td>
<td>HISTORICAL ARCHAEOLOGY AND THE PUBLIC</td>
<td>3</td>
<td>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. Crosslisted with ANTH463.</td>
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<td>HIST 464</td>
<td>INTERNSHIP IN HISTORY</td>
<td>1-6</td>
<td>Internship with a substantially historical content at a museum, historical society, historic site, government agency, or other venue, under joint supervision of Department of History and the sponsoring organization. Includes completion of journal of activities and/or a final project. PREREQ: Sophomore standing or higher. RESTRICTIONS: Requires permission of instructor or (in cases of individual student internships) pre-approval from Department of History's Undergraduate Studies Committee, which also determines the number of credits.</td>
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<tr>
<td>HIST 466</td>
<td>INDEPENDENT STUDY</td>
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HIST 468  UNDERGRADUATE RESEARCH IN HISTORY  1-3
Original research and writing conducted under the direction of a faculty member. May result in a research paper, historical exhibit, field work experience, or conference presentation, or be incorporated into a faculty project. PREREQ: HIST268. RESTRICTIONS: Majors only, or permission of instructor.

HIST 471  SEMINAR IN MEDIEVAL HISTORY  3
Topics may include Europe in the 10th Century, Europe in the 11th Century, and Women in Europe to 1600. May be crosslisted with WOMS472. PREREQ: HIST268 RESTRICTIONS: Majors only, or permission of instructor.

HIST 472  SEMINAR IN EARLY MODERN EUROPEAN HISTORY  3
Topics vary and may include Renaissance Humanism, or Women in Europe from 1100 to 1600. May be crosslisted with WOMS472. PREREQ: HIST268. RESTRICTIONS: Majors only, or permission of instructor.

HIST 473  SEMINAR IN LATE MODERN EUROPEAN HISTORY  3
Topics vary and may include history of European civilization in the 18th and 19th centuries. May be crosslisted with WOMS475. PREREQ: HIST268 RESTRICTIONS: Majors only, or permission of instructor.

HIST 477  SEMINAR IN latin american HISTORY  3
Topics vary and may include history of Latin America from 1500 to the present. May be crosslisted with UAPP631. PREREQ: HIST268. RESTRICTIONS: Majors only, or permission of instructor.

HIST 479  SEMINAR IN ASIAN HISTORY  3
Topics vary and may include History of Southeast Asia, 20th Century China or Japan in the 20th-Century. PREREQ: HIST268 RESTRICTIONS: Majors only, or permission of instructor.

HIST 480  SEMINAR IN WORLD HISTORY  3
Topics vary and may include Decolonization. PREREQ: HIST268. RESTRICTIONS: Majors only, or permission of instructor.

HIST 483  SEMINAR IN COMPARATIVE HISTORY  3
Topics vary, but all compare some aspect of American with European history or other Western history. May be crosslisted with UAPP631. PREREQ: HIST268 RESTRICTIONS: Majors only, or permission of instructor.

HIST 491  PLANNING A COURSE OF INSTRUCTION  3
Aims, course planning, instructional strategies, evaluation and selection of materials for teaching history and the social sciences in secondary schools. RESTRICTIONS: The Student Learning Portfolio must be completed by the end of this course in order to student teach in the spring semester.

HIST 492  INTEGRATING INSTRUCTIONAL TECHNOLOGY INTO SOCIAL STUDIES TEACHING  1
Provides future history teachers with the technology skills that they need in order to become more effective teachers. Melds sound instructional technology skills with the academic content and instructional methods acquired during the course of their academic career. Topics include creating websites and webquests, copyright and fair use laws, plagiarism and internet professionalism, accessing knowledge and instructional materials on the internet, using software and hardware to enhance classroom instruction, and assessment tools.

HIST 493  PROBLEMS IN TEACHING HISTORY AND SOCIAL SCIENCES  3
Helps beginning teachers carry out planned instructional strategies, analyze their teaching behavior, evaluate the effectiveness of their instruction and modify their instructional plans based on their teaching experience.

HIST 601  UNITED STATES HISTORIOGRAPHY  3
Introduces changing interpretations of United States history and examines the development of the American historical profession.

HIST 602  EUROPEAN HISTORIOGRAPHY  3
Introduces changing interpretations of various aspects of European history.

HIST 603  HISTORIOGRAPHY OF TECHNOLOGY  3
Introduces major historiographic issues and examines the development of this subfield of history.

HIST 605  HISTORIOGRAPHY OF 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 crosslisted with ARTH630, EAMC605. RESTRICTIONS: Requires permission of instructor.

HIST 606  ISSUES IN AMERICAN MATERIAL CULTURE  3
Studies major themes in American material culture of the 17th, 18th or 19th centuries. Topics vary. Crosslisted with EAMC606. RESTRICTIONS: Requires permission of instructor.

HIST 611  SEMINAR IN AMERICAN HISTORY  3-6

HIST 617  SEMINAR IN GENDER AND WOMEN'S HISTORY  3-6
Reading Seminar. Topics vary and may include U.S. Women's History, U.S. Women's History in Comparative Perspective, Gender in History, or European Women's History.

HIST 622  THE ATLANTIC WORLD  3
A graduate readings course covering roughly 1500 to 1800 on major themes in the history of the Atlantic World, including empire, identity, race, inter-imperial commerce, migration, borderlands, and Atlantic revolutions. RESTRICTIONS: Graduate students only.

HIST 623  THE REVOLUTIONARY ATLANTIC  3
A readings seminar on the Revolutionary era from 1750 to 1812 which addresses the issues of economy, identity, political culture, slavery, frontiers, and America in the Atlantic world.

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 633  THE UNITED STATES IN THE TWENTIETH CENTURY  3
Reading seminar on 20th century U.S. history.

HIST 636  RESEARCH TOPICS IN HISTORIC PRESERVATION  3
Seminar addresses a specific research issue within historic preservation including hypothesis construction, design of research methodology and evaluation of results. Emphasis on use of primary sources and application of data-base techniques. Crosslisted with UAPP636.

HIST 637  LAW AND SOCIETY IN HISTORICAL PERSPECTIVE  3
Examination of the social history of law, crime and legal institutions in the United States from colonial times to present. Focus is on the role that law has historically played in allocating resources, structuring social relationships, and distributing political power. Crosslisted with SOCI637.

HIST 638  DOCUMENTATION OF HISTORIC STRUCTURES  3
Focuses on the process of creating a physical record of a historic structure, including preparation of scaled, annotated field notes and measured drawings in AutoCAD (plans, sections, elevations and details), architectural photography, and learning to "read" the critical features of a historic resource. Crosslisted with UAPP631.

HIST 640  AFRICA UNDER COLONIAL RULE  3
Introduces various colonial policies of the European powers in Africa, emphasizing the comparisons and contrasts among these policies. Attention paid to the effect of Colonialism on Africa’s economic, social and political development.

HIST 646  CREATING EUROPEAN MODERNITY  3
The origins and spread of rapid, sustained economic growth since 1750.

HIST 652  HISTORIC PRESERVATION THEORY AND PRACTICE  3
Analysis of the theory underlying historic preservation in the United States and globally, including its history and evolution over time. Examines the impact of preservation laws and public policies, and the strategies and regulations for identifying significant structures, sites, and cultural heritage worthy of preservation. Crosslisted with UAPP629.
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. Crosslisted with UAPP654.

HIST 661  AMERICAN VERNACULAR LANDSCAPES  3
Course is a multidisciplinary reading seminar that explores the ways in which ordinary people have made and remade the American Landscape. Reading, discussion, two short papers and two required field trips.

HIST 663  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. Crosslisted with ANTH663.

HIST 671  STUDIES IN MEDIEVAL HISTORY  3-6
Topics vary and may include: Europe in the 10th Century, Europe in the 11th Century, and Women in Europe to 1600.

HIST 675  SEMINAR IN MODERN EUROPEAN HISTORY  3
Topics vary and include The Holocaust, The Cold War or Hitler's Germany.

HIST 677  STUDIES IN LATIN AMERICAN HISTORY  3
Topics vary and may include history of Mexico, history of the Caribbean or slavery in the New World.

HIST 679  STUDIES IN ASIAN HISTORY  3
Topics vary and may include History of Southeast Asia, 20th Century China or Japan in the 20th Century.

HIST 680  STUDIES IN WORLD HISTORY  3
Topics vary and may include Writing the History of Empires or History and the Global Environment.

HIST 683  STUDIES IN COMPARATIVE HISTORY  3
Topics vary, but all compare some aspect of American history with European history or Western history with non-Western history.

HIST 692  PLANNING A COURSE OF INSTRUCTION  3
Aims, course planning, instructional strategies, evaluation and selection of materials for teaching history and the social sciences in secondary schools.

HIST 693  SEMINAR: PROBLEMS IN TEACHING HISTORY AND SOCIAL SCIENCE  3
Helps beginning teachers carry out planned instructional strategies, analyze their teaching behavior, evaluate the effectiveness of their instruction and modify their instructional plans based on their teaching experience.

HIST 710  WORLD HISTORY CURRICULUM  3
This course will enable secondary social studies teachers to analyze, design, and implement meaningful and effective World History curriculum. They will construct effective teaching research models and develop best methods and strategies based on comparative analysis of regional, national, and international approaches to World History. 
COREQ: HIST715.

HIST 715  CONCEPTUALIZING WORLD HISTORY  3
This course will introduce frameworks for teaching world history. It will analyze links between the continents and the Atlantic, Pacific, and Indian Ocean worlds from ancient to modern times, as well as investigating interdisciplinary, thematic processes that continue to shape our globe.
COREQ: HIST710.

HIST 720  TOPICS IN THE ANCIENT WORLD  3
Examine how the earliest world cultures addressed the fundamental questions of social, religious and political organization and how early civilizations laid the basic building blocks for later societies. Multiple interdisciplinary and cultural perspectives on key issues and concepts will be emphasized.
PREREQ: HIST710 and HIST715. 
RESTRICTIONS: restricted to students enrolled in the Masters of Arts of Social Studies in World History program, or by instructor permission.

HIST 725  TOPICS IN THE MEDIEVAL WORLD  3
Investigate the political, economic, cultural and social development of medieval world cultures, including demographic transformation, emerging technologies, exploitation of and conflict over resources, and new concepts in the humanities. Multiple interdisciplinary and cultural perspectives on key issues and concepts will be emphasized.
PREREQ: HIST710, HIST715.

HIST 730  TOPICS IN THE EARLY MODERN WORLD  3
Investigate the rise of global processes during the early modern era, creating enduring effects both positive and negative. Race and revolution emerge as themes in this era as power shifts westward due in part to new resources from the Americas.
PREREQ: HIST710, HIST715. RESTRICTIONS: This course is restricted to students enrolled in the new MA of Social Studies in World History for teachers program. It is a required course for graduate students in this program. Other students must seek faculty approval for taking this course.

HIST 735  TOPICS IN THE MODERN WORLD  3
Investigate the political, economic, cultural and social events that linked the Atlantic, Pacific, and Indian Ocean Worlds since1800, while attending to the structures and systems of global connectivity. These events have transformed nations, culture, everyday life, and individual identity during this era.
PREREQ: HIST710, HIST715. RESTRICTIONS: This course is restricted to students enrolled in the new MA of Social Studies in World History for teachers program. It is a required course for graduate students in this program. Other students must seek faculty approval for taking this course.

HIST 740  TOPICS IN HISTORIC GLOBAL PROCESSES  3
Enable students to apply a single global process as an aid to framing and connecting the course of human history. All topics will emphasize interdisciplinary perspectives on key issues and concepts.
PREREQ: HIST710, HIST715. RESTRICTIONS: This course is restricted to students enrolled in the new MA of Social Studies in World History for teachers program. It is a required course for graduate students in this program. Other students must seek faculty approval for taking this course.

HIST 745  TOPICS IN GLOBAL ARTS AND HUMANITIES  3
Investigates the spiritual and creative heart of world cultures and societies over the course of the human endeavor, representing the standard bearers of beliefs and impulses over time. Particular emphasis will be given to cross-cultural syncretism and connections to political and social systems.
PREREQ: HIST710, HIST715. RESTRICTIONS: This course is restricted to students enrolled in the new MA of Social Studies in World History for teachers program. It is a required course for graduate students in this program. Other students must seek faculty approval for taking this course.

HIST 750  TOPICS IN REGIONAL WORLD CULTURES  3
Focuses on a single region and its culture over the course of a determined historical era. Attention will be paid to the region's distinct cultural heritage, its people's world view, and how a region's cultural identity has been a factor in shaping historical responses to external challenges and opportunities.
PREREQ: HIST710, HIST715. RESTRICTIONS: This course is restricted to students enrolled in the new MA of Social Studies in World History for teachers program. It is a required course for graduate students in this program. Other students must seek faculty approval for taking this course.

HIST 755  PROJECT RESEARCH  3 PF
Independent study to complete the program project under the supervision of an advisor.
RESTRICTIONS: This course is restricted to students enrolled in the new MA of Social Studies in World History for teachers program. It is a required course for graduate students in this program. It is designed to be the last course taken in the program.

HIST 803  RESEARCH AND WRITING SEMINAR: AMERICA TO 1860  3
Original research and writing on subjects in American history before 1860. Evaluation of sources, interpretation of evidence and presentation of research papers. Emphasis on professional standards of criticism.

HIST 804  MUSEUM INTERNSHIP  3
Internship practice in administration, collections management, exhibition and interpretation at museums and related institutions. Students spend ten full weeks, or the equivalent, at the University museum, Winterthur Museum, Hagley Museum, Longwood Gardens or other acceptable institution.
Crosslisted with MSST804. RESTRICTIONS: Open to graduate students only. Requires at least one semester course in museum studies and permission of instructor.

HIST 805  RESEARCH AND WRITING SEMINAR: AMERICA 1860-PRESENT  3
Original research and writing on subjects in American history after 1860. Evaluation of sources, interpretation of evidence and presentation of research papers. Emphasis on professional standards of criticism.
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<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>HIST 866</td>
<td>SPECIAL PROBLEM</td>
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<tr>
<td>HIST 868</td>
<td>RESEARCH</td>
<td>1-9 PF</td>
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<tr>
<td>HIST 869</td>
<td>MASTER'S THESIS</td>
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<td>HIST 964</td>
<td>PRE-CANDIDACY STUDY</td>
<td>1-12 PF</td>
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<td>HIST 969</td>
<td>DOCTORAL DISSERTATION</td>
<td>1-12 PF</td>
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**Health Promotion**

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<th>Course Code</th>
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<td>HLPR 166</td>
<td>SPECIAL PROBLEM</td>
<td>1-3 PF</td>
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<tr>
<td>HLPR 211</td>
<td>INTRODUCTION TO PUBLIC HEALTH</td>
<td>3</td>
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<td>HLPR 222</td>
<td>INTRODUCTION TO EPIDEMIOLOGY</td>
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<td>HLPR 233</td>
<td>INTRODUCTION TO GLOBAL HEALTH</td>
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<td>HLPR 266</td>
<td>SPECIAL PROBLEM</td>
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<td>HLPR 366</td>
<td>SPECIAL PROBLEM</td>
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<tr>
<td>HLPR 430</td>
<td>BEHAVIOR CHANGE STRATEGIES AND TACTICS</td>
<td>3</td>
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<td>HLPR 466</td>
<td>SPECIAL PROBLEM</td>
<td>1-3 PF</td>
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<tr>
<td>HLPR 605</td>
<td>CONCEPTS OF CHRONIC DISEASE MANAGEMENT</td>
<td>3</td>
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<td>HLPR 610</td>
<td>HEALTH AND THE MEDIA</td>
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<td>HLPR 630</td>
<td>BEHAVIOR CHANGE STRATEGIES AND TACTICS</td>
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**Health Coaching**

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<tr>
<td>HLPR 631</td>
<td>HEALTH COACHING</td>
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<td>HLPR 632</td>
<td>HEALTH SCIENCE DATA ANALYSIS</td>
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<tr>
<td>HLPR 664</td>
<td>HEALTH COACHING PRACTICUM</td>
<td>1-3 PF</td>
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**Advanced Health Promotion Programming and Evaluation**

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<td>ADVANCED HEALTH PROMOTION PROGRAMMING AND EVALUATION</td>
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**Topics and Issues in Health Promotion**

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<td>TOPICS AND ISSUES IN HEALTH PROMOTION</td>
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**Health Psychology and Behavioral Medicine**

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<td>HLPR 811</td>
<td>HEALTH AND OLDER ADULTS</td>
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**Health Behavior**

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**Social Marketing**

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**Human Response to Stress**

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**Research**

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<td>HLPR 864</td>
<td>INTERNSHIP</td>
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<td>HLPR 866</td>
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<tr>
<td>HLPR 868</td>
<td>RESEARCH</td>
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University of Delaware Course Catalog Fall-2016
HLTH 166  SPECIAL PROBLEM  1-6

HLTH 241  ETHICAL ASPECTS OF HEALTHCARE  3
Study of basic ethical thought and principles and their application to selected contemporary issues in healthcare.

HLTH 266  SPECIAL PROBLEM  1-6

HLTH 320  CHRONIC ILLNESS IN AMERICA  3
Interdisciplinary perspective on current health care issues for individuals with chronic illness, including development of client relationships, disease-specific information, caregiving, resource navigation, and health policy. Service learning component involves providing assistance to chronically ill individuals within the home setting.

PREREQ: ENGL110.

HLTH 352  HEALTH SCIENCES HONORS SEMINAR  1 PF
Peer-reviewed scientific articles related to the broad areas of public health, health behavior, medicine, nursing, and physiology will be presented and discussed by University of Delaware faculty.

RESTRICTIONS: College of Health Sciences honors students and CAS Medical Scholars Program students only. No freshmen.

HLTH 366  SPECIAL PROBLEM  1-6

HLTH 395  GLOBAL INTERNSHIP IN HEALTH SCIENCES  1-6
Guided experiential learning designed to enhance cultural understanding in global health care settings. Selected issues and problems of the people and healthcare delivery are explored within the global context.

HLTH 411  TOPICS IN HEALTH  3
Selected issues and problems related to individual or population health. Exploration of some topics may include an experiential component. Variable topics.

RESTRICTIONS: Can be repeated twice when topics vary.

HLTH 466  SPECIAL PROBLEM  1-6

HLTH 490  CLINICAL RESEARCH PRACTICUM  1-6
Directed research experience with a clinical population of participants either on- or off-campus.

HLTH 491  CARE COORDINATION PRACTICUM  1-6
Supervised experience in which students function as patient navigators, coordinating patient care and connecting patients with available services in a clinical setting either on- or off-campus.

HLTH 495  HEALTH STUDIES PRACTICUM  6 PF
Directed service learning experience in a health services setting.

RESTRICTIONS: Restricted to senior health studies majors.

HLTH 610  NEURAL BASES OF SPEECH AND HEARING  3
Examines neuroanatomical and neurophysiological bases of language, hearing, sensory, and motor function. Special emphasis given to brain behavior correlates and behavioral consequences to speech, language, and hearing as a result of neurologic injury or disease.

RESTRICTIONS: Restricted to students admitted to the M.A. in Speech-Language Pathology.

HLTH 611  RESEARCH METHODS IN SPEECH DISORDERS  3
Reviews research methods in communication disorders, including research design, interpretation of published research, preparing students to be critical consumers of the research literature. Focuses on types of research, research designs, research methods, evidence-based practice, and statistics commonly used to investigate normal and disordered human communication.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 612  COUNSELING IN SPEECH-LANGUAGE PATHOLOGY  2
Addresses basic skills in interviewing, counseling, and behavior management supporting the diagnosis, treatment, and management of speech, language, and hearing disorders. Highlights key counseling issues, including professional boundaries, intense emotions, and counselor's feelings and reactions as well as principles and strategies related to behavior management.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 613  HEARING ASSESSMENT AND TREATMENT  3
Anatomy and physiology of hearing, including pathologies and disorders affecting the auditory system. Addresses components of adequate evaluation for placement and educational planning; diagnosis using instrumental, functional and communication assessment; stimulation and utilization of residual hearing; and management of assistive/augmentative devices.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 620  DIAGNOSTIC METHODS IN SPEECH PATHOLOGY  3
Introduces basic diagnostic methods and clinical processes for the evaluation of spoken/written language disorders. Includes steps in clinical problem solving, fundamental concepts of clinical measurement, models of diagnosis, clinical history and interview techniques, and report writing.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 630  CHILDHOOD SPEECH PRODUCTION DISORDERS  3
Examines patterns of normal speech and phonological development and the nature, assessment, and treatment of articulation and phonological disorders of childhood.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 631  LANGUAGE DISORDERS IN YOUNG CHILDREN  2
Addresses theoretical and applied aspects of typical, delayed and disordered language development in children ages 0 to 5 with an emphasis on family-centered assessment and intervention practices, including prelinguistic and early language interventions.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 632  LANGUAGE DISORDERS IN SCHOOL CHILDREN  2
Examines the principles and procedures used in the assessment and treatment of school-aged language and literacy disorders. Emphasizes the relationship among verbal and non-verbal language impairment, literacy skills, and the linguistic demands of academic settings.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 634  ASSESSMENT AND TREATMENT OF VOICE DISORDERS  2
Addresses the physiology, acoustics, and perception of voice quality and speech resonance. Covers the etiology, evaluation, and treatment of voice and resonance disorders.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 635  ASSESSMENT OF FLUENCY DISORDERS  2
Addresses characteristics of fluent speech and the nature and treatment of stuttering and cluttering in children and adults in relation to normal speech production processes, human learning, principal explanations of stuttering, and treatment approaches.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 636  ASSESSMENT OF MOTOR SPEECH DISORDERS  2
Addresses motor speech disorders resulting from neuropathology of the central and peripheral nervous systems as found in cerebral palsy, Parkinsonism, and other developmental and acquired neuromotor problems of children and adults.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 637  FEEDING AND SWALLOWING DISORDERS  2
Reviews anatomy and physiology or normal and abnormal swallowing in adults and children. Specific etiological categories are discussed. Clinical and instrumental diagnostic methods are described and emphasis is given to treatment methods using a critical decision making model.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 638  AUGMENTATIVE AND ALTERNATIVE COMMUNICATION  2
Focuses on needs of people with significant communication limitations and means for enhancing communicative competence through the use of augmentative tools and strategies. Addresses the assessment process, the selection/development/customization of communication systems, and applications of AAC across a wide spectrum of populations.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 639  CLEFT PALATE AND RELATED DISORDERS  2
Covers the nature and causes of cleft lip, palate and other craniofacial dysmorphology. Specific focus on issues of speech, language and hearing problems, incorporating principles of assessment, treatment and research.

RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.
HLTH 640  **SEMINAR IN COMMUNICATION DISORDERS**  2
Prepares students for successful completion of the SLP Praxis Examination required to obtain ASHA certification and licensure through participation in class discussions and completion of practice tests. It covers the nine ASHA areas of specialty and all 7 areas of the PRAXS SLP.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 642  **PROFESSIONAL ISSUES**  3
Covers a range of topics pertinent to students entering professional practice as speech-language pathologists, including current legal, ethical, and clinical service provision issues.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 650  **DISORDERS IN DIVERSE POPULATIONS**  2
Provides theoretical and applied information about situational factors impacting spoken and written language, including individual differences due to gender, handicapping conditions, socio-economic status, and cultural-ethnic background.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 651  **SPEECH PATHOLOGY IN SCHOOL SETTINGS**  2
Explores administrative, legal, ethical, and clinical issues encountered in implementing programs to remediate communication disorders in the school-aged population in the public school setting.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 652  **SPEECH PATHOLOGY IN MEDICAL SETTINGS**  2
Explores administrative, legal, ethical and clinical issues encountered in addressing communication limitations arising from acute and chronic conditions in the medical setting.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 653  **ATYPICAL LANGUAGE DEVELOPMENT**  2
Addresses identification and treatment of early communication and language disorders in children with autism, Down syndrome and other intellectual and developmental disabilities. Reviews how language development processes can be disrupted by biological and environmental events.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 654  **SEMINAR IN SPEECH-LANGUAGE PATHOLOGY**  2
Offers detailed examination of emerging issues of significance in clinical and/or research areas of the discipline.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 660  **PRACTICUM AND SEMINAR IN SLP**  2
The first clinical experience in which students are paired and assigned to clients in the campus clinic. The seminar provides practical support and guidance; presentations and discussions help students draw connections between academic coursework and initial clinical experiences.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 661  **CLINICAL PRACTICUM**  1
Supervised clinical practice with individuals having a history of speech, language and hearing disorders. Practicum includes diagnosis, treatment, and management work through direct client contact. Conducted in the campus clinic.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 662  **CLINICAL PRACTICUM IN AUDIOLOGY**  1
Supervised clinical practice in the screening, assessment and treatment of hearing disorders.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 663  **ADVANCED CLINICAL PRACTICUM**  2
On-campus clinical practice with clients exhibiting a variety of communication disorders.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 664  **DIAGNOSTIC PROCEDURES IN SLP**  3
Clinical practicum involving evaluation and diagnosis of a variety of communication disorders with clients in the campus clinic.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 665  **SCHOOL PRACTICUM IN SLP**  4
Clinical practicum with a variety of communication disorders in off-campus settings, including early intervention, early care and education, and school-based facilities for individuals from birth through age 21.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 666  **PRACTICUM IN HEALTH FACILITIES**  4
Clinical practicum with a variety of communication disorders in off-campus medical settings such as hospitals, clinics and rehabilitation facilities.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 670  **FIELD PLACEMENT IN SCHOOL SETTINGS**  9
Offsite clinical practicum experience, completed under the supervision of community-based clinical professionals, focused on the evaluation and treatment of speech, language, cognitive-communication, and swallowing disorders in early intervention, early care and education, and school-based settings.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 680  **FIELD PLACEMENT IN HEALTH FACILITIES**  9
Offsite clinical practicum experience, completed under the supervision of community-based clinical professionals, focused on the evaluation and treatment of speech, language, cognitive-communication, and swallowing disorders in hospital, clinic and rehabilitation settings.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HLTH 813  **LEADERSHIP AND INNOVATION IN POPULATION HEALTH**  3
Examines theories of leadership and models of change and innovation in healthcare. Gain a systems perspective useful in analyzing the leadership and management needs of healthcare organizations. Examine the key drivers affecting contemporary healthcare delivery. Special emphasis will be placed on developing leaders capable of leading innovation and change in healthcare.
Crosslisted with NURS813.

HLTH 843  **POLICY & FINANCE FOR HEALTHCARE DELIVERY**  3
Examines nursing leadership required for population health evaluation and service delivery with a specific focus on policy development and healthcare financing. Gain knowledge needed to position doctorally prepared nurses to develop, implement and evaluate policies, programs and financing structures to support innovative methods of decreasing rates of disease and increasing wellness to improve population health.
Crosslisted with NURS843.  PREREQ: NURS810.  RESTRICTIONS: For nursing majors only.

HLTH 844  **POPULATION HEALTH INFORMATICS**  3
Integrates knowledge of healthcare information technology and public health data to support and facilitate individual and population health management and improvement. Focuses on the analysis and application of information technologies that support the provision of care including social context, availability of technology, and structure of information along with legal, regulatory, and ethical concerns. Emerging technologies and contemporary issues are highlighted.
Crosslisted with NURS844.

HLTH 869  **THESIS**  1-6 PF
Scholarly activity under the direction of a faculty supervisor.
RESTRICTIONS: Restricted to students in the M.A. in Speech-Language Pathology.

HONR 290  **HONORS COLLOQUIUM: ARTS AND HUMANITIES TOPICS**  3
Interdisciplinary studies with primary emphasis on the aesthetic context and will encourage exploration, understanding and appreciation of artist, literary, and/or philosophical traditions. RESTRICTION: Open to eligible Honors Program first-year students.

HONR 291  **HONORS COLLOQUIUM: HISTORY AND CULTURE TOPICS**  3
Interdisciplinary studies with a primary emphasis on the historical development of the topic being explored. RESTRICTION: Open to eligible Honors Program first-year students.

HONR 292  **HONORS COLLOQUIUM: SOCIAL/BEHAVIOR TOPICS**  3
Interdisciplinary studies with the primary purpose of studying humans and their interactions with each other and their environment. RESTRICTION: Open to eligible Honors Program first-year students.

HOSP 140  **INFORMATION TECHNOLOGY AND SERVICES MANAGEMENT**  3
Overview of the service industry, its history, current status and future trends. Uses an integrated approach to the study of services, stressing the importance of understanding the underlying processes of service delivery and the way new technologies are affecting them.

HOSP 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.
HOSP 187 INTRODUCTION TO HOSPITALITY INFORMATION MANAGEMENT 3
Provides an overview of the information systems and technology applications used in the hospitality industry to support operations and management decision-making. Also covers hospitality specific software applications.

HOSP 201 FOOD PRINCIPLES 3
Examines the chemical and physical properties of food and its preparation. Includes the composition and structure of food, functional properties of ingredients, and methods to obtain desired sensory and nutritional qualities. Special focus on food sanitation and safety.
COREQ: HRIM211.

HOSP 211 FOOD PRINCIPLES LABORATORY 1
Principles of food selection and preparation as related to the chemical and physical properties of food. Includes the composition and structure of food, functional properties of ingredients, and methods to obtain desired sensory and nutritional qualities.
COREQ: HRIM201

HOSP 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.

HOSP 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 alongside the issue of sustainable development within the industry.

HOSP 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.

HOSP 217 CATERING MANAGEMENT 3
Application of management principles to the catering function. Topics include: developing catering management systems; catering menu planning and design; on-premise versus off-premise catering management; and food production. Students plan and implement actual catered events.

HOSP 219 QUALITY MANAGEMENT FOR THE HOSPITALITY INDUSTRY 3
Examines the quality revolution in the hospitality industry. Control charts, Pareto charts, scatter diagrams, and other tools used in restructuring, re-engineering, and continuous quality improvement are explored. Integrates principles of customer quality focus and organizational behavior as they apply to the hospitality industry.

HOSP 230 EXECUTIVE PRESENTATIONS AND PROBLEM SOLVING 3
Examines various problem solving methods relating to specific issues of the hospitality industry. Explores oral, written and multi-media executive presentation techniques of problem solving results including personal presentations.

HOSP 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.

HOSP 314 HOSPITALITY ENTREPRENEURSHIP AND VENTURE CREATION 3
Provides an overview of venture creation in hospitality enterprises from concept development to capital creation. Examines various business structures used in hospitality businesses including franchising and management contracts.

HOSP 316 CROSS CULTURAL ETIQUETTE AND PROTOCOL 3
Introduces students to a range of mores and decorum required to effectively work with and offer services to international visitors and associates. Various levels of treatment accorded domestic and international dignitaries within specific types of events and accommodations in the hospitality industry are also discussed.

HOSP 317 SPA/WELLNESS MANAGEMENT&ENTREPRENEURSHIP 3
Spa and Wellness industries are one of the fastest growing segments in the service industry offering a variety of fitness, wellness, life enhancement, and management opportunities. Globally, hotels and hospitals are adding spa/wellness programs to their offerings, as their customers are increasingly demanding complimentary and alternative medicine (CAM). The geographic market of this segment transcends the national borders into international destinations. This program could be offered both at the UD campus or any popular spa/wellness destinations in the world.

HOSP 321 QUANTITY FOOD SERVICE MANAGEMENT 1
Principles of quantity food service management with an emphasis on quality and cost control. Topics include menu planning and technical operations, as well as labor, food and energy cost containment.
PREREQ: HRIM201 and HRIM211. COREQ: HRIM325.

HOSP 325 LABORATORY IN QUANTITY FOOD SERVICE MANAGEMENT 2
Laboratory experience in quantity food production, service and management. Applications in safety, sanitation, technical operations and quality and cost controls in a quantity food service environment.
PREREQ: HRIM201 and HRIM211 COREQ: HRIM321

HOSP 327 PROPERTY ENGINEERING 3
Introduction to problems of cost and operational control of security, safety, parking, preventive maintenance, laundry, HVAC, electrical, refrigeration, plumbing, fire prevention, care of guest rooms and public space.

HOSP 330 INTERNATIONAL HOSPITALITY OPERATIONS 3-5
How hotels, food service operations and tourism attractions function outside of the United States, with particular emphasis on Europe. Focuses on cultural, political, environmental, geographic and economic factors critical to successful international hospitality operations.

HOSP 335 HOSPITALITY FACILITY DESIGN 3
Explores architectural design processes, including both aesthetic and functional design, as they relate to hospitality venues such as restaurants, hotels, commercial kitchens and resorts. Examines the impact of codes, construction costs and environmental parameters that affect hospitality construction.

HOSP 346 TRAVEL INTERNET MARKETING 3
Provides information necessary to understand online hospitality and travel related marketing. Through the use of case studies and examples, students learn how to manage the design, implementation and evaluation of web-based marketing programs.

HOSP 355 ECOtourism ENTREPRENEURSHIP 3
Sustainable development has received international recognition and a source of business social and economic responsibility. The underlying principles for a sustainable business development are complex, involving interaction among social, economic, and environmental issues, which make the subject critical for intellectual enquiry. The concept of sustainable development is multidisciplinary requiring students how to draw knowledge from various disciplines, such as business and economics, sociology, environmental sciences, and public administration among others.

HOSP 364 EVENT AND MEETING MANAGEMENT PRACTICUM 1-3
Average of 10 hours a week working as an intern under the direction of a selected client, along with academic modules that will be completed under the direction of a faculty member in the Department of Hotel, Restaurant and Institutional Management. Duties and expectations of the practicum will be under the guidance of the practicum sponsor. The faculty member will identify a practicum sponsor (client) for each student.
PREREQ: HRIM215. RESTRICTIONS: Competitive selection process requires students to submit a Resume for consideration and will be interviewed by both the faculty member and the practicum sponsor.

HOSP 366 INDEPENDENT STUDY 1-6

HOSP 380 MANAGEMENT OF LODGING OPERATIONS 3
Management of front desk, housekeeping, maintenance, security and conference operations.

HOSP 381 MANAGEMENT OF FOOD AND BEVERAGE OPERATIONS 3
Management tools available to control sales and expenses in food and beverage operations. Analysis of centers of responsibility. Cost management approach to development of control systems.
PREREQ: HRIM321
HOSP 382 MANAGERIAL ACCOUNTING AND FINANCE IN THE HOSPITALITY INDUSTRY 3
Generation and analysis of quantitative information for planning, control and decision making by managers at various levels. Use of timely and relevant information as a vital tool in management. PREREQ: ACCT207.

HOSP 390 CRUISE SHIP MANAGEMENT 1-3
Learn “Best Practices” of cruise ship management with a focus on the hospitality industry with this Study at Sea. Students will learn from cruise managers and staff including how the cruise industry operates and responds to the consumer. Students will participate in cruise ship talks and tours. RESTRICTIONS: This is a study abroad course.

HOSP 418 BEVERAGE MANAGEMENT 3
Beverages are a large profit and cost center for hospitality operations and requires proper management attention. Alcoholic beverages are a complex product category with legal and social issues that require special attention from management. The wide range of products, their high costs, and legal concerns associated with serving alcohol call for unique procurement, inventory and issuing systems. This course examines these issues along with an in-depth study of wine, beer, distilled spirits and non-alcoholic beverages.

HOSP 425 HISTORIC ROADSIDE ARCHITECTURE 3
Examines various historic hospitality and retail venues with emphasis on their development throughout this automobile based century. Hotels, motels, diners, fast food and full service restaurants, roadside attractions and retail outlets will be discussed as they relate to travel and tourism.

HOSP 448 DATA ANALYTICS IN THE HOSPITALITY INDUSTRY 3
Focuses on the value and characteristics of data and the relationships embedded within variables, so as to explore, analyze and determine relationships to improve hospitality service delivery and overall firm performance across a wide range of metrics. The mechanics of identifying data points, studying their characteristics and exploring relationships will be based on principles of statistical modeling and analysis and applied within the context of the hospitality industry. PREREQ: HRIM180 or MISY160 and HRIM180 or BUAD110.

HOSP 450 CAPSTONE: STRATEGIC HOSPITALITY MANAGEMENT 3
This capstone hospitality business course examines management issues surrounding the implementation of sound strategic management tools, theories and techniques in supporting hospitality operations from a guest service perspective and strategic decision making from the viewpoint of management. PREREQ: Pre- or Co- requisite: FINC311, BUAD301, BUAD309, HRIM380, HRIM481. COREQ: Pre- or Co- requisite: FINC311, BUAD301, BUAD309, HRIM380, HRIM481.

HOSP 464 INTERNATIONAL HOSPITALITY INTERNSHIP 1-6
International internship under the supervision of a University of Delaware based professor and an onsite internship coordinator. Experience working in a hospitality related internship with written reflections on the cultural and business practices of the host country.

HOSP 466 INDEPENDENT STUDY 1-6

HOSP 480 HUMAN RESOURCES MANAGEMENT IN THE HOSPITALITY INDUSTRY 3
Techniques and philosophies of personnel management as applied to hospitality operations. Motivation, attitude formation and job satisfaction. Case studies related to theories of organizational behavior and industrial psychology.

HOSP 481 MARKETING IN THE HOSPITALITY INDUSTRY 3
Application of marketing principles in hotel, restaurant and institutional management settings. Development of marketing strategies in both profit and non-profit hospitality operations.

HOSP 482 LAW OF INNKEEPING 3
Introduction to the laws relating to hotel, restaurant and institutional operations.

HOSP 488 HRIM LOGGING MANAGEMENT PRACTICUM I 1-4
Structured experience in a hospitality industry environment. At least 40 hours per credit hour in planned activities associated with the management and operation of a subsystem of a hospitality property.

HOSP 489 HRIM RESTAURANT MANAGEMENT PRACTICUM II 6
Structured experience in a hospitality industry environment. At least 40 hours per credit hour in planned activities associated with the management and operation of a hospitality property. PREREQ: HRIM321, HRIM325 and HRIM488.

HOSP 495 HOSPITALITY FEASIBILITY STUDIES 3
Examine a review of feasibility methods of a potential lodging franchise in a given market, review market data, evaluate potential franchises, develop facility and design requirements, examine revenue streams and cash flows and its economic viability. PREREQ: ACCT207, ACCT208, HRIM380, HRIM481, HRIM381, HRIM382, and FINC311. RESTRICTIONS: Available only after taking 90 credits. Available only in the Senior Year.

HOSP 601 ADVANCED HOSPITALITY AND TOURISM PRODUCT MANAGEMENT 3
Reviews different types, styles and quality of hospitality and tourism products. Examines product management including branding, product lifecycles, positioning and packaging. Includes the latest trends in product development and theoretical and practical issues related to multi-unit operations.

HOSP 602 CUSTOMER SERVICE MANAGEMENT 3
Provides an understanding of the service delivery system as it relates to the delivery of quality customer service in interpersonal and electronic contexts. The mechanics of identifying and setting organizational vision and service standards, and the relevance of technology in customer service management are covered.

HOSP 603 STRATEGIC HOSPITALITY MANAGEMENT 3
Provides a comprehensive understanding of strategic management concepts and competitive strategy as applied to the hospitality industries. Examines co-alignment of environmental scanning, strategy and structure of the hospitality service firm.

HOSP 604 ISSUES IN HOSPITALITY FINANCIAL MANAGEMENT 3
Examines both managerial accounting and financial management as they are practiced in the hospitality industry. Applies principles of finance and accounting to decision-making in the industry, emphasizing industry features and characteristics.

HOSP 605 ISSUES IN HOSPITALITY INFORMATION TECHNOLOGY MANAGEMENT 3
Examines issues related to information technology in the hospitality industry, including systems, networking, databases, telecommunications, the internet and e-commerce.

HOSP 642 PROJECT MANAGEMENT APPLICATIONS IN HOSPITALITY 3
A back to business approach to the management and development of interactive technology applications in the hospitality industry. Focuses on understanding project management concepts and techniques and applying them to the creation of interactive technology-based projects.

HOSP 643 HISTORIC ROADSIDE ARCHITECTURE 3
Examines various historic hospitality and retail venues with emphasis on their development throughout this automobile based century. Hotels, motels, diners, fast food and full service restaurants, roadside attractions and retail outlets are discussed as they relate to travel and tourism. Crosslisted with JPAPP643.

HOSP 648 DATA ANALYSIS IN THE HOSPITALITY INDUSTRY 3
Overview of basic data analysis principles, techniques, and applications useful in conducting quantitative research in hospitality business management. Focuses on analyzing and interpreting of customer and organizational data using relevant statistical software. PREREQ: HBM601. RESTRICTIONS: Priority for MS HBM students.

HOSP 664 HOSPITALITY TECHNOLOGY INTERNSHIP 3
Supervised technology-related work experience with a hospitality business or related organization.

HOSP 668 INDUSTRY PROJECT 3
Provides the opportunity to research, design and/or develop the solution to a real-world hospitality technology-related problem or issue.
HOSP 687  MANAGEMENT SYSTEMS IN THE HOSPITALITY INDUSTRY  3
Examines issues surrounding the implementation of information technology in supporting hospitality operations from a guest service perspective and decision making from the viewpoint of management. Case studies and review of various software utilized to understand the various subsystems in a hospitality property. PREREQ: HRIM601

HOSP 764  ADVANCED LODGING PRACTICUM  3
Experience-driven learning course in a live hotel. On the operational side, students will complete a rotation of the various departments of the hotel. The managerial component includes exposure to General Manager duties at financial, operational and strategic levels. PREREQ: HRIM601, HRIM602, HRIM603, HRIM604, HRIM642, HRIM648, and HRIM687. RESTRICTIONS: Only after taking 21 credits of 600 or higher level HRIM courses.

HOSP 815  E-SERVICE MANAGEMENT IN HEALTHCARE  3
The rapid pace of technological change is having a significant impact on healthcare service delivery. In this course, students will develop strategies for designing, implementing, and articulating e-service solutions in the healthcare industry. Concepts related to technology and e-services will be applied to a healthcare context using academic articles, industry reports, and case studies. RESTRICTIONS: MBA and MS Students only in B&E. All others by permission.

HOSP 840  PATIENT EXPERIENCE & ENGAGEMENT  3
Engages healthcare community in critical issues facing the healthcare industry. Due to CMS, HCAHPS and CGAHPs requirements and intense industry competition, the effectiveness of healthcare delivery is being measured by the quality of direct and indirect services, including quality of accommodations, communication and other auxiliary services. Current hospital staff and future hospital managers need to be better prepared to face the changing healthcare environment and the increased focus on a total patient experience and engagement.

HOSP 866  SPECIAL PROBLEM  1-6

HOSP 869  MASTER’S THESIS  1-6

HOSP 875  HOSPITALITY MANAGEMENT RESEARCH  3
This capstone course is to identify specific problems and opportunities in the hospitality industry. During the research process, students will develop strategies to solve the specific problem and highlight the relevant implications to the findings for industry and academia. Three types of research qualify - empirical research, case studies and business plan/projects. PREREQ: HRIM601 and HRIM602 and HRIM648. RESTRICTIONS: Must have completed 12 credits in the MS Hospitality Business Management program.

HSAD 604  ADVANCED PRACTICE ROLES FOR HEALTHCARE PROVIDERS  3
Focuses on roles and issues affecting healthcare providers engaged in advanced practice. Roles are analyzed in relation to current issues and concepts of advanced practice. May be crosslisted with NURS604. RESTRICTIONS: Permission required from department.

HSAD 619  FINANCIAL MANAGEMENT IN HEALTH SERVICES ORGANIZATIONS  3
Provides the basic principles and concepts of effective management of budgets for healthcare units. Includes analysis of the environment and departmental organization and their impact on healthcare. May be crosslisted with NURS619. RESTRICTIONS: Permission of department required.

HSAD 635  HEALTH ADMINISTRATION THEORIES  3
Theories of administration, organization and management, their interaction with other health discipline theories and their influence on management of healthcare agencies. Includes the interaction of theories with attainment of institutional goals. May be crosslisted with NURS635. PREREQ: NURS604. COREQ: NURS604.

HSAD 637  HEALTH PLANNING STRATEGIES  3
Analyzes organizational systems and roles of managers and administrators. Students identify organizational needs, formulate goals and objectives appropriate to healthcare agencies and identify strategies appropriate to accomplishing goal attainment with ethical constraints of healthcare. May be crosslisted with NURS637. PREREQ: NURS604 and NURS609 or Permission of Instructor. COREQ: NURS604.

HSAD 638  HEALTH SERVICES EVALUATION  3
Emphasizes the role of managers and administrators in personnel development, promotion of research in clinical settings and development and implementation of quality improvement initiatives and their implications for healthcare. May be crosslisted with NURS638. PREREQ: NURS604 and NURS609. COREQ: NURS604.

HSAD 664  HEALTH SERVICES ADMINISTRATION PRACTICUM  1-3
In conjunction with his/her faculty advisor and based on student’s individualized long range goals, student selects a preceptor and healthcare setting in which to apply didactic contact in real life settings. Requires 126 hours of on-site experience, which can be taken in one semester or divided over three semesters. COREQ: HSAD635, HSAD637, or HSAD638.

HSAD 868  RESEARCH: SCHOLARLY PROJECT  1-3
Investigation of a problem in clinical settings related to finance, administration, personnel management, public policy or education, resulting in completion of a scholarly project. PREREQ: Research and statistics and any two of the following: HSAD635, HSAD637, HSAD638

HSAD 890  COLLOQUIUM  0 PF
See NURS890 for course description.

ITALIAN

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

ITAL 106  ITALIAN II - ELEMENTARY/INTERMEDIATE  4
Completion of basic Italian. Increasing mastery of the basic skills of speaking, listening, reading and writing. PREREQ: ITAL105 RESTRICTIONS: 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. Satisfies College of Arts and Sciences language requirement.

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

ITAL 205  ITALIAN CONVERSATION  3
Practical use of Italian by means of oral reports and discussions. Emphasis on improvement of basic conversational skills. Grammar review and written work when appropriate. PREREQ: ITAL107 RESTRICTIONS: Prerequisite requires a minimum grade of B. One 200-level Italian course may be substituted for Prerequisite.

ITAL 206  CULTURE THROUGH CONVERSATION  3
Discussion of topics drawn from contemporary Italian life. Designed for students who wish to broaden their knowledge of Italian culture while improving their oral and aural language skills. PREREQ: ITAL107 RESTRICTIONS: Taught abroad only.

ITAL 208  ITALY: PAST AND PRESENT  3
An introduction to Italy, its history, its culture, its people, their way of life and the issues confronting them. RESTRICTIONS: Taught abroad only, in both English and Italian. Not for major credit. Does not satisfy the language requirement.

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

ITAL 212  ITALIAN READING AND COMPOSITION: DRAMA AND PROSE  3
Reading and discussion of some major 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, terminology and syntactical patterns) and aspects of the Italian business community. PREREQ: ITAL107
ITAL 305 **ADVANCED ITALIAN CONVERSATION AND COMPOSITION** 3
Discussion of current cultural, social and political topics in Italy. Vocabulary building, grammar exercises and frequent compositions.
PREREQ: ITAL211 or ITAL212

ITAL 306 **PRACTICAL ORAL/Written Expression** 3
Offered abroad only, is designed to strengthen skills in grammar and vocabulary in preparation for advanced courses offered in second part of the semester. Class exercises include oral exposures, discussion of articles and videos, textual analysis and compositions.
PREREQ: Any two 200-level Italian courses conducted in Italian RESTRICTIONS: Taught abroad only.

ITAL 308 **CONTEMPORARY ITALY II** 3
Discussion and study of issues related to contemporary cultural, political and social developments in Italy, including its place in today’s European community. The course will be conducted in Italian.
PREREQ: Any two 200-level Italian courses taught in the Italian language RESTRICTIONS: Taught abroad only.

ITAL 310 **SURVEY OF ITALIAN LITERATURE** 3
Development of Italian literature from its origins to the mid-17th century. Study and discussion of representative works.
PREREQ: ITAL211 or ITAL212

ITAL 311 **SURVEY OF ITALIAN LITERATURE** 3
Development of Italian literature from the mid-17th century to the present. Study and discussion of representative works.
PREREQ: ITAL211 or ITAL212

ITAL 325 **ITALIAN CIVILIZATION AND CULTURE I** 3
A survey of the major cultural, social and political developments in Italy from the Etruscans to the 15th century.
PREREQ: ITAL211 or ITAL212

ITAL 326 **ITALIAN CIVILIZATION AND CULTURE II** 3
A survey of the major cultural, social and political developments in Italy from its Unification to the present.
PREREQ: ITAL211 or ITAL212

ITAL 355 **SPECIAL TOPICS** 3
Explores an area of special interest in Italian literature or cultural studies. See http://primus.nss.udel.edu/CoursesSearch/ for topics.
PREREQ: Any 300-level Italian course. 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 questione della lingua; linguistic analysis of old Italian texts; and the effects of social, political and cultural factors on usage. Influences from and on other languages.
PREREQ: Any two 300-level Italian courses RESTRICTIONS: May be offered jointly with ITAL603.

ITAL 406 **ADVANCED ITALIAN LANGUAGE** 3
Grammatical structure and stylistics with special attention given to technical vocabulary and discourse, e.g., business, law, science and agriculture.
PREREQ: Any 300-level Italian course RESTRICTIONS: Taught abroad only.

ITAL 454 **ITALIAN CINEMA** 3
Study of modern Italian cultural history through cinema.
PREREQ: Any two 300-level courses. RESTRICTIONS: May be repeated for credit when topics vary.

ITAL 455 **SELECTED AUTHORS, WORKS AND THEMES** 3-12
Works of one or more outstanding authors or on a special theme.
PREREQ: Any two Ital 300-level literature courses RESTRICTIONS: Can be repeated for credit when topics vary. May be offered jointly with ITAL655.

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. Some translation.

ITAL 603 **HISTORY OF THE ITALIAN LANGUAGE** 3
Development of the Italian language from its Latin origins. Exposition of the questione della lingua; linguistic analysis of old Italian texts; and the effects of social, political and cultural factors on usage. Influences from and on other languages.
RESTRICTIONS: May be offered jointly with ITAL403.

ITAL 655 **SELECTED AUTHORS, WORKS AND THEMES** 3-12
Seminar on works of one or more outstanding authors or on a special theme. RESTRICTIONS: Can be repeated for credit when topics vary. May be offered jointly with ITAL455.

JAPN 105 **JAPANESE I - ELEMENTARY** 4
Introduction to the contemporary Japanese language through developing listening comprehension, speaking, reading, and writing skills, including mastery of the Hiragana and Katakana syllabaries and introduction to Kanji characters. Media Center resources utilized.

JAPN 106 **JAPANESE II - ELEMENTARY/INTERMEDIATE** 4
Continued practice in the aural, oral, reading, and writing skills of contemporary Japanese, including the identification and reproduction of basic Kanji characters. Introduction to formality levels and critical verb forms needed for more advanced communication. Media Center resources utilized.
PREREQ: JAPN105 RESTRICTIONS: Two to three years of high school Japanese acceptable in lieu of prerequisite.

JAPN 107 **JAPANESE III - INTERMEDIATE** 4
Development of aural, oral, reading, and writing skills at the intermediate Japanese level, including continued practice in identifying and reproducing Kanji characters, handling a greater variety of formality levels, and verb forms. Media Center resources utilized.
PREREQ: JAPN106 RESTRICTIONS: Four years of high school Japanese acceptable in lieu of prerequisite. Satisfies College of Arts and Sciences language requirement.

JAPN 200 **JAPANESE GRAMMAR AND COMPOSITION** 3
Further study of Japanese grammar, Kanji characters and reading and writing skills for communication. Emphasis on grammar, Kanji and essay writing.
PREREQ: JAPN107.

JAPN 201 **ADVANCED INTERMEDIATE JAPANESE I** 3
First of the two-course series which form the core of 200-level Japanese, the other being JAPN202. The goal is to build upper intermediate level grammar, vocabulary, and Kanji. All four areas of language (listening, reading, speaking, and writing) are emphasized.
PREREQ: JAPN107.

JAPN 202 **ADVANCED INTERMEDIATE JAPANESE II** 3
Second of the two-course series which form the core of 200-level Japanese. (The other is JAPN201.) The goal is to build upper intermediate level grammar, vocabulary, and Kanji with specific emphasis on fluency. All areas of language (listening, reading, speaking, and writing) are emphasized.
PREREQ: JAPN201 or JAPN206.

JAPN 204 **THE ART OF JAPANESE CALLIGRAPHY** 3
Practical training in Japanese calligraphy, using brush, inkstone and sumi ink. Students will work with both phonetic syllabaries and kanji characters.
PREREQ: One JAPN course. RESTRICTIONS: Does not satisfy CAS language requirement. Taught in English and Japanese.

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: One of the following JAPN107, JAPN200, JAPN201, JAPN202, JAPN209. RESTRICTIONS: Prerequisite requires a minimum grade of B.

JAPN 206 **CULTURE THROUGH CONVERSATION** 3
Discussion of topics drawn from contemporary Japanese life. Designed for students who wish to broaden their knowledge of Japanese culture while improving their oral and aural language skills.
PREREQ: ONE of the following: JAPN107, JAPN200, JAPN201, JAPN202, JAPN209. 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. May be repeated for credit when topics vary.
JAPN 209  INTERMEDIATE SITUATIONAL JAPANESE  3
Practical training in Japanese for formal situations. Students develop all four language skills in such contexts as job interviews, telephone etiquette, correspondence and relations with supervisors. Skills and role-playing featured. PREREQ: ONE of the following: JAPN200, JAPN201, JAPN202, JAPN205, JAPN206.

JAPN 300  ADVANCED JAPANESE  3
Introduction to new grammar through conversation, kanji-writing skills, essay and letter writing. Textbook exercises will be used in conjunction with a variety of reading materials. PREREQ: THREE of the following: JAPN200, JAPN201, JAPN202, JAPN205, JAPN209 or ONE of the following: JAPN305, JAPN355, JAPN306.

JAPN 305  JAPANESE CONVERSATION AND COMPOSITION  3
Discussion of current cultural, social and political topics in Japanese. Vocabulary building, grammar exercises and frequent compositions. PREREQ: THREE of the following: JAPN200, JAPN201, JAPN202, JAPN205, JAPN209 or ONE of the following: JAPN301, JAPN355, JAPN306.

JAPN 306  PRACTICAL ORAL AND WRITTEN EXPRESSION  3
Designed to increase fluency and vocabulary. Grammar review focuses on special problems. PREREQ: THREE of the following: JAPN200, JAPN201, JAPN202, JAPN205, JAPN206, JAPN209 or ONE of the following: JAPN301, JAPN305, JAPN306; or permission of instructor. RESTRICTIONS: Taught abroad only.

JAPN 308  CONTEMPORARY JAPAN II  3
A further look into contemporary Japan, its culture, people, way of life and issues confronting them. PREREQ: JAPN208. RESTRICTIONS: Taught abroad only, in both English and Japanese. Research papers, essays, and tests in Japanese.

JAPN 355  SPECIAL TOPICS  3
Explores an area of special interest in Japanese literature or culture studies. See http://primus.nss.udel.edu/CoursesSearch/ for topics. PREREQ: THREE of the following: JAPN200, JAPN201, JAPN202, JAPN205, JAPN206, JAPN209, or ONE of the following: JAPN301, JAPN305, JAPN356; or permission of instructor. RESTRICTIONS: May be repeated for credit three times when topics vary.

JAPN 366  INDEPENDENT STUDY  1-3
This course allows the student to pursue their own goals in learning the Japanese language at the intermediate level. PREREQ: THREE of the following: JAPN200, JAPN201, JAPN202, JAPN205, JAPN206, JAPN209, Plus permission of instructor.

JAPN 401  USING JAPANESE: ISSUES IN CONTEMPORARY SOCIETY  3
Provides advanced instruction in Japanese grammar at the 400 level. Textbooks will provide a good basis for students to build grammar and discuss social issues such as marriage, illness, careers for women, and globalization. Students will also discuss issues using complementary materials chosen by the instructor (newspapers, magazines, television and so on). PREREQ: JAPN301 plus one other JAPN course at the 300 level.

JAPN 405  JAPANESE TRANSLATION: THEORY AND PRACTICE  3
Explores the major issues in translating a Japanese literary text into English, including synonym choice, literal versus loose translation, poetic license and the tense-aspect controversy. Students will find their own method of translation, balancing creative expression with accuracy and fidelity to the text. PREREQ: JAPN301 plus one other JAPN course at the 300 level.

JAPN 407  TOPICS: ADVANCED JAPANESE PRACTICE AT AIU  1 PF
An elective for students enrolled in Akita International University’s JPL402, a 6-credit 400-level Core Course (combination of two 3-credit UD courses: JAPN401, 405, 455). This course is listed as: JPL431: Japanese Practice (Fall) in the AIU catalog. It is a self-guided 1-credit Pass/Fail course.
COREQ: AIU catalog number JPL402 which is a combination of two of UD’s JAPN401, 405, 455 while at AIU. RESTRICTIONS: Restricted to students studying at AIU.

JAPN 408  JAPN408: SKILLS IN ADVANCED JAPANESE  2-3
An elective for students enrolled in Akita International University’s JPL402, a 6-credit 400-level Core Course (combination of two 3-credit UD courses: JAPN401, 405, 455). AIU offers various courses that target specific linguistic areas such as JPL411:Speaking (2 credits); JPL421:Writing (2); JPL461: Pronunciation(2), JPL442:English Japanese Translation(2); and JPL521: Chinese-Japanese Translation(3). May take more than one Topic class in a semester.
COREQ: AIU catalog number JPL402 which is a combination of two of UD’s JAPN401, 405, 455 while at AIU. RESTRICTIONS: Restricted to students studying at AIU.

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
This course allows the student to pursue their own goals in learning the Japanese language at the advanced level. PREREQ: TWO of the following: JAPN301, JAPN305, JAPN355, Plus permission of instructor.

JAPN 490  RESEARCH THESIS IN JAPANESE  3
Allows students to conduct research and write a thesis on a topic of their choosing related to Japanese culture. The thesis is written in Japanese and class discussion is also in Japanese. Students use research sources in both English and Japanese. This is a challenging course aimed at seniors in the Japanese Studies Major in their last semester at UD. PREREQ: Two courses in Japanese at the 400 level. RESTRICTIONS: For students in the Japanese Studies Major.

JOURNAL

JOUR 301  INTRODUCTION TO JOURNALISM  3
Introduction to history, practice and issues of journalism in variety of formats. Gateway to journalism, exposing students to challenges and opportunities of discipline, as well as work ethic and career responsibilities faced in the field. As an overview, helps students determine if journalism is right for them. PREREQ: Grade of B or better in ENGL110.

JOUR 311  MULTIMEDIA JOURNALISM  3
Focuses on writing and idea communication through a digital medium. Students will learn writing and reporting skills while creating their own news website. Students will learn how to combine those skills with pictures, audio and video to create a complete digital news package. RESTRICTIONS: Journalism minors only.

JOUR 329  BROADCAST NEWSWRITING  3
Emphasizes broadcast newswriting fundamentals and comparisons to other forms of writing. Includes news judgment, news gathering, and news editing, as well as integration of current events. Crosslisted with COMM329. RESTRICTIONS: COMM and COMI majors not minoring in JOUR.

JOUR 425  ETHICS AND ISSUES IN JOURNALISM  3
Examination of issues faced by journalism and journalists today, including different standards of truth, competing responsibilities (to readers, sources, corporate shareholders), blending of news and entertainment, and changing nature of journalism in digital age. PREREQ: JOUR301.

JOUR 464  INTERNSHIP IN JOURNALISM  3
Internship experiences under joint supervision of Journalism faculty and the sponsoring organization.

JEWISH STUDIES

JWST 101  INTRODUCTION TO JUDAISM  3
Foundation course for the Jewish Studies minor but also open to all students interested in learning about the history, traditions, and customs of Judaism, the tenets of the religion, its relation to other world religions, etc.

JWST 105  HEBREW I - ELEMENTARY  4
Introduction to the Hebrew alphabet and language, and development of basic speaking, listening, reading and writing skills. Crosslisted with HEBR105.

JWST 106  HEBREW II - ELEMENTARY/INTERMEDIATE  4
Continuation of Elementary Hebrew. Increasing mastery of the basic skills of speaking, listening, reading, and writing through texts, conversations and songs. Crosslisted with HEBR106. PREREQ: HEBR105. Those with background other than HEBR105 should see instructor for appropriate placement.

JWST 107  HEBREW III - INTERMEDIATE  4
Strengthening grammar skills, continued practice in speaking, listening, writing and reading through conversation, texts and songs. Crosslisted with HEBR107. PREREQ: HEBR106. Those with background other than HEBR106 should see instructor for appropriate placement.

University of Delaware Course Catalog Fall-2016
JWST 146  INTRODUCTION TO JEWISH CULTURE AND HISTORY 3
Focus on Jewish history from the Biblical period to the present. Study the origins of a group of people who call themselves, and whom others call, Jews. Focus on place, movement, power/powerlessness, gender, and the question of how to define Jews over time and place. Explores Jews as a group of people bound together by a particular set of laws; looks at their dispersion and diversity; explores Jews’ interactions with surrounding cultures and societies; introduces the basic library of Jews; sees how Jews relate to political power. Crosslisted with HIST146.

JWST 166  SPECIAL PROBLEM 1-4

JWST 201  ISSUES AND IDEAS IN JEWISH STUDIES 1
A forum for scholars to share their thoughts and research on the culture, literature and history of the Jewish people. Topics range from historical reviews to contemporary issues.

JWST 202  BIBLICAL AND CLASSICAL LITERATURE 3
Study of Greek, Roman, and Biblical literatures, set in their mythical, historical and cultural contexts, introducing appropriate critical concepts. Crosslisted with ENGL202. PREREQ: ENGL110.

JWST 205  HEBREW CONVERSATION 3
Practical conversational drills on the Hebrew language, with stress on interaction. Emphasis on the improvement of conversational skills for social situations, as well as grammatical competence and reading comprehension through multicultural themes including the revival of the Hebrew language and various issues related to Hebrew culture. Crosslisted with HEBR205. PREREQ: HEBR107 or equivalent

JWST 207  TEL AVIV AND JERUSALEM THROUGH TIME 3
A cultural comparison of Tel Aviv and Jerusalem. Tel Aviv and Jerusalem represent different aspects and faces of Israeli society. Our exploration of the two cities will unravel the histories of these cities, while at the same time, look at their present structural, cultural, and social components. Crosslisted with HEBR208.

JWST 209  CONTEMPORARY ISRAEL THROUGH FILM 3
Development of oral and written proficiency in Hebrew through discussion and analysis of Israeli films pertaining to major issues in the development of the young state. Grammar review where needed. Crosslisted with HEBR209. PREREQ: HEBR107 or one 200-level Hebrew course or professor’s permission. MINIMUM DEGREE OF A- REQUIRED FOR HEBR107 AND MINIMUM DEGREE OF B REQUIRED FOR A 200-LEVEL COURSE.

JWST 212  JEWS AND AMERICAN POP CULTURE 3
As the Jewish population of America grew rapidly during the early decades of the 20th century, Jews brought with them a rich and diverse tapestry of dramatic and theatrical modes. This course will examine the development of this extraordinary creative and commercial phenomenon. Crosslisted with THEA212.

JWST 222  RELIGION IN MODERN AMERICA 3
Surveys major themes in American religious history since the Civil War, including religion and social reform, politics, popular culture, and everyday life. Crosslisted with HIST222.

JWST 225  JEWISH MUSIC 3
Designed to present a study of the Jewish music as it has evolved from biblical era through the contemporary period. Encompass the numerous cultures and lands that the Jewish people have found themselves residing from Australia to America, Brazil to Bombay and many more. The course will look at the formal presentation of music in religious life, the creative presentation in social and religious life, and to the languages, styles, and cross-fertilization that happens when civilizations combine. From the synagogue to the street, the school room and bedroom, music is one lens through which we can understand Jewish life. May be crosslisted with MUSC225.

JWST 250  COMPARATIVE GENOCIDE 3
Examines genocidal acts in the 20th century in a comparative framework. Cases include genocides of Armenians, Jews, Cambodians, Bosnians, and Rwandans. Topics include political and racial ideology, government institutions, perpetrator motivations, international responses, and genocide prevention. Crosslisted with HIST250.

JWST 254  JEWISH HOLOCAUST: 1933-1945 3
Focuses on the infamous "Final Solution," with particular emphasis on the roots of Anti-Semitism, National Socialist policies and plans, ghetto and camp life, the Einsatzgruppen, resistance, the politics of rescue and the art and literature of the Holocaust. Crosslisted with HIST254.

JWST 266  SPECIAL PROBLEM 1-3

JWST 303  WOMEN IN THE HOLOCAUST 3
Examines the role of women who encountered the Holocaust. Such information has often been overlooked in the study of the Holocaust. Adding the perspective of gender will enrich our understanding and offer a more complete picture of what happened. Students will read a variety of texts, engage in group work and create a final project that demonstrates both what they have learned and what they wanted to learn about women in the Holocaust. May be crosslisted with WOM303.

JWST 308  TOPICS IN JEWISH THEOLOGY 3
Critical evaluation of the theological views of major branches of Judaism on such topics as: the significance of Israel, the status of Jewish law, the meaning of Jewish ritual and the mission of the Jewish people. Crosslisted with PHIL308. PREREQ: PHIL208 recommended.

JWST 310  ANTISEMITISM PAST AND PRESENT 3
Explore the history of antisemitism from the early Christian period to the present day. Focus on the changing nature of anti-Jewish hostility in various contexts, including depictions of Jews in the Gospels, myths and stereotypes of Jews in medieval Christian Europe, and modern forms of racial and social antisemitism in Europe, the Middle East, and the United States.

JWST 318  STUDIES IN FILM 3
Special topics such as film genres, major directors and Soviet cinema. Crosslisted with ENGL318. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

JWST 327  TOPICS IN JEWISH HISTORY 3
Introductory courses on focused topics in the history of Jewish people from ancient to modern times. Course topics explore the development of religion, culture, politics, and demography of Jews throughout the Diaspora and in modern Israel. Crosslisted with HIST327.

JWST 333  ISRAELI FILM: REFLECTING DRAMATIC CHANGE 3
Inquiry into Israeli films from the immediate postwar period to present. Historical and societal changes emphasized. Aesthetic and technical elements of film production and reception featured. Discussion intensive.

JWST 335  ISRAELI LITERATURE: IDENTITY, GLOBALIZATION AND CONFLICT 3
Through analysis of leading Israeli authors’ literary works, this course explores major themes pertaining to Israeli society’s contemporary character. Surveyed topics include Zionism and post-Zionism; Globalization; Jewish and Non-Jewish citizens of Israel; the Israeli military’s influence on civilian life; personal trauma; terrorism and its effects on national life.

JWST 345  MODERN ISRAEL: HISTORY AND CULTURE 3
Many factors contribute to a diverse and intriguing Israeli society. Topics include the roots of Zionism, the concept of the Israeli Sabra, the effects of the Holocaust, ethnic groups and the Arab-Israeli conflict, through history, film, literature and music.

JWST 348  CONTEMPORARY JEWISH-AMERICAN LITERATURE 3
Lectures and discussions of outstanding contemporary Jewish American novelists, short story writers, and others. Crosslisted with ENGL348. PREREQ: ENGL110

JWST 349  INTRODUCTION TO JEWISH SOURCES: TEXT AND INTERPRETATION 3
Examines the central texts which form the basis of Jewish thought, religion and culture— the Torah, or Hebrew Bible (in translation) and the interpretive traditions which have evolved to understand it (e.g., Midrash, Rashi, contemporary theology) as sources of uniquely Jewish meanings. Crosslisted with ENGL349.

JWST 350  STUDIES IN JEWISH LITERATURE 3
Focus on Jewish writers, stories, and/or culture from around the world. Course content will address issues, concepts, or problems such as: anti-Semitism, passing, secularism, Jewish-Christian and Jewish-Muslim relations, Diaspora, homeland, nation, race, ethnicity, and/or the Holocaust. Crosslisted with ENGL350. RESTRICTIONS: May be taken up to three times when topics vary.
JWST 360  SOCIOCY OF RELIGION  3
Sociological analysis of religious practices and beliefs that are practiced in the contemporary United States, including changes in religious affiliation and the effect of religion on social change, political behavior, gender roles, sexuality, racial inequality, and cultural membership. Crosslisted with SOCI360.

JWST 363  MODERN JEWISH HISTORY  3
Following the French Revolution Jewish life throughout Europe and the US underwent significant changes with respect to legal equality, civic rights, and religious reform. This course will focus on the ways in which Jewish history transformed and was transformed by the experience of modernity. Crosslisted with HIST363.

JWST 365  STUDIES IN LITERARY GENRES, TYPES AND MOVEMENTS  3
Particular areas or writers to be announced. Crosslisted with ENGL365. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

JWST 366  INDEPENDENT STUDY  1-3

JWST 377  ARAB-ISRAELI POLITICS  3
Development of the Arab-Israeli conflict analyzed from the Dreyfus Affair and the Balfour Declaration to current events. Crosslisted with POSC377.

JWST 381  HISTORY OF THE ARAB-ISRAELI CONFLICT  3
Explores the roots and the historical complexity of the Arab-Israeli conflict. Topics include: the origins of Zionism, the nature of traditional Arab/Ottoman society in the 19th century, the relationship between the early Zionists and indigenous Arab population of Palestine, the creation of a Jewish society, the rise of Palestinian nationalism, and the protracted search for coexistence between Jews and Arabs. Crosslisted with HIST380.

JWST 382  STUDIES IN MULTICULTURAL LITERATURE IN ENGLISH  3
Consideration of multiculturalism as it pertains to American culture or literature in English from Africa and other non-European societies. Variable in historical range, geography, and genre. Crosslisted with ENGL382. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

JWST 398  TOPICS IN MEDIEVAL HISTORY  3
Course topics vary and may be chronologically or thematically based. Examples include "Christians & Muslims in the Middle Ages" and "Germany in the Middle Ages." May be repeated for credit when topics vary. Crosslisted with HIST398.

JWST 430  COMPARATIVE SOCIOLOGY  3-6
Exposes sociological similarities and differences between the United States and a selected country on a number of critical sociological topics. Topics include ethnic and religious diversity, culture, demographic structure, social institutions, social stratification and urbanization. Crosslisted with SOCI430. RESTRICTIONS: Requires permission of instructor. Only three credits may apply toward departmental requirement of six 400-level credits. Offered only in the study abroad program and subject to acceptance by the Office of International Programs.

JWST 466  INDEPENDENT STUDY  1-3

JWST 480  LITERARY STUDIES SEMINAR  3
Intensive capstone seminar employs research presentations as the occasion for students to consolidate skills acquired in 100-, 200-, and 300-level coursework. Content varies by expertise of instructor. Crosslisted with ENGL480. PREREQ: ENGL 110 and six ENGL credits at the 300 level or higher or by instructor consent. RESTRICTIONS: Can be repeated once when topics vary. Only counts toward major if taken as senior (after completing 90 credits). [Non-seniors are not excluded, but a student who completes the course before senior year must re-take the course as a senior for major credit

JWST 482  AMERICA IN THE MIDDLE EAST  3
Examines history of America's engagement with an emphasis on issues since 1979. After brief intro portion on the mechanics of American foreign policy-making and America's global political and strategic position over time, we will spend most of the semester on America's involvement in regional oil politics, Middle East peace process, first and second Iraq Wars, relations with Iran, plans for Middle East democratization and the Bush II administration. Evaluation will be based upon a mid-term and final exam, a medium-length research paper, and one or two short writing assignments. Crosslisted with POSC482.

KINESIOLOGY & APPL PHYSIOLOGY

KAAP 105  FRESHMAN SEMINAR IN EXERCISE SCIENCE  1 PF
Introduction to biomechanics, exercise physiology, and motor control, including familiarization with types of laboratory research and career opportunities associated with each discipline.

KAAP 155  LIFESTYLE AWARENESS - ATHLETIC TRAINERS  3
Exploration into the basic principles of healthy lifestyle awareness necessary for athletic training students to satisfy the educational competencies mandated by the National Athletic Trainers Association. Serves as the First Year Experience (FYE) requirement for all Athletic Training Interest students.
RESTRICTIONS: Open to athletic training interest (ATI) only.

KAAP 180  INTRODUCTION TO EXERCISE SCIENCE  3
Introduction to the science of human movement. Survey of selected topics in the areas of exercise physiology, sports medicine, biomechanics, exercise psychology, and motor control.

KAAP 210  EMERGENCY MANAGEMENT OF INJURIES AND ILLNESSES  3
Emergency management of life-threatening and non-life-threatening injuries and illnesses. Includes CPR skills and initial and secondary assessments; first aid for wounds, burns, heat illnesses, and cold illnesses; and injuries to the head, spine, chest, and extremities.

KAAP 220  ANATOMY AND PHYSIOLOGY  3
Structure and function of the human body: skeletal, muscular, circulatory, respiratory, nervous, endocrine, digestive and urinary systems. Foundation course for all areas of physical education and athletics.
RESTRICTIONS: Students may not receive credit for KAAP220 if taken after completion of KAAP309.

KAAP 240  INTRODUCTION TO ATHLETIC TRAINING  3
Orientation to athletic training as a career in the health care industry and introduction to the prevention and care of injuries in the physically active population. PREREQ: KAAP220. COREQ: KAAP220. RESTRICTIONS: Restricted to Athletic Training Interest (ATI) students only. Not open to students who have taken KAAP305.

KAAP 257  ATHLETIC TRAINING PRACTICUM I  3 PF
Supervised clinical experience in athletic training. Development of competencies and proficiencies in content areas comprising the role of an athletic trainer, as specified in the NATA’s Athletic Training Educational Competencies. PREREQ: KAAP240. RESTRICTIONS: Open to athletic training majors only.

KAAP 258  ADVANCED TAPING AND BRACING TECHNIQUES  1 PF
Laboratory experience in advanced taping, wrapping, bracing and splinting; variations for upper and lower extremity orthopedic injuries; emergency and non-emergency on-field transportation techniques; and equipment fitting and modification techniques.
RESTRICTIONS: Open to athletic training majors only.

KAAP 266  SPECIAL PROBLEM  1-3 PF
Sophomore level independent study.

KAAP 268  SOPHOMORE SPECIAL TOPICS  1-4 PF
Sophomore level independent study.

KAAP 285  INTRODUCTION TO RESEARCH IN HEALTH SCIENCES  3
Explore basic elements of research in health sciences, including experimental design, statistics, ethics, and human subjects and biosafety certification. Investigate research techniques used in laboratories in the Department of Kinesiology and Applied Physiology, elsewhere on campus and at other collaborating sites.
RESTRICTIONS: Restricted to Freshman - Junior status.

KAAP 301  LIFESPAN MOTOR DEVELOPMENT  4
Motor skill development across the lifespan from infancy through adulthood in both typical and atypical populations. Focus is on behavioral aspects of movement pattern change, and analysis of underlying mechanisms related to that change, such as neuromaturation, growth, and biomechanics. Includes Service Learning experiences.
RESTRICTIONS: Requires at least Sophomore standing.

KAAP 305  FUNDAMENTALS OF SPORTS HEALTH CARE  3
Students will gain an understanding of the prevention, assessment and treatment of athletic injuries. Laboratory sessions will involve learning basic sports health care skills.
PREREQ: KAAP220 or KAAP309. RESTRICTIONS: Credit cannot be received for both KAAP305 and KAAP240.
KAAP 309 HUMAN ANATOMY AND PHYSIOLOGY I 4
Structure and function of the human body for pre-professionals in clinical and allied health fields. Emphasis on integumentary, skeletal, muscular, and nervous systems.
PREREQ: CHEM104 or CHEM108, and BISC208.

KAAP 310 HUMAN ANATOMY & PHYSIOLOGY II 4
Structure and function of the human body for pre-professionals in clinical and allied health fields. Emphasis on endocrine, circulatory, respiratory, digestive, and urinary systems.
PREREQ: KAAP309.

KAAP 320 PRINCIPLES OF STRENGTH/CONDITIONING 4
Addresses scientific basis of strength and conditioning based upon principles related to biomechancis, exercise physiology, injury prevention techniques and anatomy. Emphasis on program design, energy systems, advanced lifting techniques, nutrition, plyometrics, ergogenic aids and effects of strength training on the cardiovascular system.
PREREQ: KAAP220 or KAAP309. RESTRICTIONS: Open to students whose major or minor requires this course.

KAAP 350 BASIC CONCEPTS IN KINESIOLOGY 3
Review of musculoskeletal anatomy and lever systems provides foundation for analyzing human movement. Practical kinesiological evaluation focuses on common fitness and health related exercises. Movement analysis and proper techniques discussed for cardiovascular machines, abdominal work, stretching, etc.
PREREQ: KAAP220 or KAAP309. RESTRICTIONS: Open to students whose major or minor requires this course.

KAAP 353 PRE-PROFESSIONAL SEMINAR 2 PF
Prepares exercise science majors with planning of employment and/or advanced degree opportunities. Includes in-depth resume and cover letter writing, interviewing techniques, standardized test preparation and personalized career inventory and career exploration projects.
RESTRICTIONS: Restricted to exercise science majors. Requires junior status.

KAAP 357 ATHLETIC TRAINING PRACTICUM II 3 PF
Supervised clinical experience in athletic training. Development of competencies and proficiencies in content areas comprising the role of an athletic trainer, as specified in the NATA’s Athletic Training Educational Competencies.
PREREQ: KAAP257. RESTRICTIONS: Open to athletic training majors only.

KAAP 358 ATHLETIC TRAINING PRACTICUM III 3 PF
Supervised clinical experience in athletic training. Development of competencies and proficiencies in content areas comprising the role of an athletic trainer, as specified in the NATA’s Athletic Training Educational Competencies.
PREREQ: KAAP357. RESTRICTIONS: Open to athletic training majors only.

KAAP 366 INDEPENDENT STUDY 1-6 PF

KAAP 368 JUNIOR SPECIAL TOPICS 1-4
Junior level independent study.

KAAP 395 SPORT MEDICINE PHARMACOLOGY 3
Provides athletic training majors with an understanding of the origin, chemistry, effects and uses of medications commonly used in sports medicine. Major topics include pharmacokinetics, indications, contraindications, adverse reactions, management of overdose, photophoresis, iontophoresis, drugs affecting skeletal muscle, pain and inflammation.
PREREQ: KAAP358. RESTRICTIONS: Open to athletic training majors only.

KAAP 400 RESEARCH METHODS 3
Introduction to research on health and physical activity, including types of research, research design, matching appropriate statistical tools with research designs, research writing style and format and ethical issues related to research. PREREQ: Junior or senior standing. STAT200 or MATH201 or PSYC209. RESTRICTIONS: Open only to majors in Exercise Science and the Health Studies Occupational Therapy Track.

KAAP 405 REHABILITATION OF ATHLETIC INJURIES I 3
Foundations of injury treatment and rehabilitation, including the healing process, neuromuscular control, flexibility and range of motion, strength/power/endurance, postural stability and balance, and cardio-respiratory considerations.
PREREQ: KAAP357 RESTRICTIONS: Open to athletic training majors only.

KAAP 406 REHABILITATION OF ATHLETIC INJURIES II 3
Building upon the content of KAAP405, students develop enhanced proficiency with rehabilitation techniques and skills for both the upper and lower extremities, as well as the trunk and low back regions.
PREREQ: KAAP405 RESTRICTIONS: Open to athletic training majors only.

KAAP 407 PREVENTION AND RECOGNITION OF ATHLETIC INJURIES 3
Procedures for preventing, diagnosing, treating and rehabilitating athletic injuries. Emphasis on early detection of both nature and extent of injury.
PREREQ: KAAP480 and KAAP481. RESTRICTIONS: Open to AT majors only.

KAAP 409 THERAPEUTIC MODALITIES 4
Provides both theory and clinical experience in the use of the most common types of therapeutic modalities utilized in sports medicine.
RESTRICTIONS: Open to athletic training majors only.

KAAP 417 INTRODUCTION TO LABVIEW 3
LabView is a graphical programming language that is widely used in exercise science laboratories and clinics. This course will provide students with a functional knowledge of the LabView programming environment with applications in biomechanics, motor control, and exercise physiology.

KAAP 420 FUNCTIONAL HUMAN ANATOMY 5
Anatomical individuality, functional significance and human performance interpretations involved through consideration of muscular, skeletal and nervous systems. Laboratory experience emphasizes meaning and significance of musculoskeletal movements and utilizes prospected human specimens, models, x-rays, dry biological materials and other aids.
PREREQ: KAAP220 or KAAP309. RESTRICTIONS: Open to athletic training majors and to honors program majors in exercise science.

KAAP 425 BIOMECHANICS OF HUMAN MOTION 4
Study of the fundamental mechanical principles governing the human body in motion and at rest, including application of statics and dynamics in the quantitative analysis of sport and exercise.
PREREQ: KAAP220 or KAAP309. RESTRICTIONS: Open only to students in the athletic training major, health and physical education major, figure skating coaching minor, and strength and conditioning minor.

KAAP 426 BIOMECHANICS I 4
Application of mechanical principles in the study of the human musculoskeletal system, including analysis of joint forces, as well as the mechanical properties of bone, muscle, and connective tissues.
PREREQ: PHYS201 or PHYS207; KAAP309. RESTRICTIONS: Open to exercise science majors only.

KAAP 427 BIOMECHANICS II: MEASUREMENT OF HUMAN MOTION 3
Provides information on measurement of human motion in three dimensions and on calculation of inverse dynamics in two dimensions as applied to analysis of human motion.
PREREQ: KAAP417 and KAAP426. RESTRICTIONS: Open to exercise science majors only.

KAAP 428 MOTOR CONTROL AND LEARNING 4
Teaches concepts in the control and learning of human movement, with emphasis on historical and contemporary theories, psychomotor aspects of movement, learning and performance, and the fundamental systems related to perception and action.
PREREQ: KAAP309. RESTRICTIONS: Open to exercise science majors and minors.

KAAP 430 EXERCISE PHYSIOLOGY 4
Study of the integration of human physiological systems in the performance of exercise, work and sports activities and under the influence of environmental stressors.
PREREQ: KAAP220 or KAAP310 or BISC276 or BISC306. RESTRICTIONS: Open to majors and minors in exercise science, athletic training, health studies, health studies/OT or strength and conditioning.

KAAP 433 APPLIED PHYSIOLOGY OF ACTIVITY 4
Function of human body during exercise, including integration of body systems during exercise, work, and sport activities and ways in which environment impacts performance.
PREREQ: KAAP220. RESTRICTIONS: Restricted to majors in Health Behavior Science and Health and Physical Education and minors in Strength and Conditioning.

KAAP 434 TWELVE-LEAD ELECTROCARDIOGRAM INTERPRETATION 3
Study of all aspects of electrocardiography including arrhythmia identification, rate determination, axis deviation, heart blocks, hypertrophy and myocardial infarction patterns.
PREREQ: KAAP430.

KAAP 440 TOPICS IN EXERCISE SCIENCE 3
Course content varies each semester with a focus on topics within Kinesiology and Applied Physiology.
RESTRICTIONS: Open to seniors or with permission of instructor. May be repeated for nine credits when topics vary.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAAP 441</td>
<td>READINGS IN BIOMECHANICS AND MOTOR CONTROL</td>
<td>1 PF</td>
<td></td>
<td>In depth discussion of peer reviewed scientific articles in the areas of biomechanics and motor control. Both classic papers and current literature will be discussed. RESTRICTIONS: Open to junior and senior exercise science majors or with permission of instructor.</td>
</tr>
<tr>
<td>KAAP 442</td>
<td>READINGS IN APPLIED PHYSIOLOGY</td>
<td>1 PF</td>
<td></td>
<td>In depth discussion of peer reviewed scientific articles in the area of applied physiology. Both classic papers and current literature will be discussed. RESTRICTIONS: Open to junior and senior exercise science majors or with permission of instructor.</td>
</tr>
<tr>
<td>KAAP 447</td>
<td>ADVANCED TOPICS IN STRENGTH AND CONDITIONING</td>
<td>3</td>
<td></td>
<td>Theoretical principles for developing individualized strength and conditioning programs based on biomechanical, physiological and neural concerns, including calculations of volume, intensity and tonnage. Topics include teaching progressions and technique training for Olympic style exercises, weight room safety and weight room design. PREREQ: Junior or senior standing. Completion of KAAP320, KAAP350 and KAAP425 or KAAP426 with at least a C-. KAAP426 may be a corequisite. RESTRICTIONS: Restricted to minors in strength and conditioning.</td>
</tr>
<tr>
<td>KAAP 448</td>
<td>ORGANIZATION AND ADMINISTRATION</td>
<td>3</td>
<td></td>
<td>Information for prospective certified athletic trainers on organization and administration of athletic training programs as identified by the NATA. Topics include record keeping, purchasing and maintenance of equipment and facilities and policies and procedures for the operation of an athletic training program. RESTRICTIONS: Open to athletic training majors only.</td>
</tr>
<tr>
<td>KAAP 449</td>
<td>ADVANCED TOPICS IN SPORTS MEDICINE</td>
<td>3</td>
<td></td>
<td>Exposure to a variety of medical specialists and allied health professionals including physical therapists, dentists, nurses and specialists in orthopaedics, neurology, cardiology, pediatrics, internal medicine, ophthalmology and physical medicine. RESTRICTIONS: Open to athletic training majors only.</td>
</tr>
<tr>
<td>KAAP 457</td>
<td>ATHLETIC TRAINING PRACTICUM IV</td>
<td>3 PF</td>
<td></td>
<td>Supervised clinical experience in athletic training. Development of competencies and proficiencies in content areas comprising the role of an athletic trainer, as specified in the NATA’s Athletic Training Educational Competencies. PREREQ: KAAP358. RESTRICTIONS: Open to athletic training majors only.</td>
</tr>
<tr>
<td>KAAP 458</td>
<td>ATHLETIC TRAINING PRACTICUM V</td>
<td>3 PF</td>
<td></td>
<td>Supervised clinical experience in athletic training. Development of competencies and proficiencies in content areas comprising the role of an athletic trainer, as specified in the NATA’s Athletic Training Educational Competencies. PREREQ: KAAP457 RESTRICTIONS: Open to athletic training majors only.</td>
</tr>
<tr>
<td>KAAP 459</td>
<td>ATHLETIC TRAINING PRACTICUM VI</td>
<td>3 PF</td>
<td></td>
<td>Supervised clinical experience in athletic training. Development of competencies and proficiencies in content areas comprising the role of an athletic trainer, as specified in the NATA’s Athletic Training Educational Competencies. PREREQ: KAAP458. RESTRICTIONS: Open to athletic training majors only.</td>
</tr>
<tr>
<td>KAAP 462</td>
<td>PRACTICUM IN STRENGTH AND CONDITIONING</td>
<td>3 PF</td>
<td></td>
<td>Directed practical experience in a strength and conditioning environment. PREREQ: Completion of KAAP447 with at least a C-. COREQ: KAAP447. RESTRICTIONS: Strength and conditioning minors only.</td>
</tr>
<tr>
<td>KAAP 463</td>
<td>PRACTICUM IN EXERCISE SCIENCE</td>
<td>1-6 PF</td>
<td></td>
<td>Directed practical experiences in clinical aspects of exercise science. Please request the practicum handbook from the instructor on record and follow the procedures for enrollment. Some clinical sites require background checks, health and immunization histories, TB testing or certificate, or drug screenings. Specific sites may impose additional academic requirements. RESTRICTIONS: Exercise Science majors only. At least junior status or permission of instructor.</td>
</tr>
<tr>
<td>KAAP 466</td>
<td>INDEPENDENT STUDY</td>
<td>1-6 PF</td>
<td></td>
<td></td>
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<tr>
<td>KAAP 468</td>
<td>SENIOR SPECIAL TOPICS</td>
<td>1-4</td>
<td></td>
<td>Senior level independent study.</td>
</tr>
<tr>
<td>KAAP 475</td>
<td>CLINICAL EXERCISE PHYSIOLOGY</td>
<td>4</td>
<td></td>
<td>Methods of evaluating cardiovascular function through graded exercise tests as well as principles of exercise prescription. Theoretical as well as practical covering of administrative aspects of testing, metabolic calculations, variety of testing protocols, basic exercise physiology and exercise prescription. PREREQ: KAAP430. RESTRICTIONS: Open to exercise science majors only.</td>
</tr>
<tr>
<td>KAAP 480</td>
<td>UPPER EXTREMITY AND SPINE EVALUATION</td>
<td>3</td>
<td></td>
<td>Evaluation of the upper extremity, cervical spine and facial injuries. SOAP format evaluation, on-field evaluation, mechanics and pathomechanics of joint movement, detailed anatomy, etiology of specific injuries and special and stress tests will be discussed. PREREQ: KAAP220 and KAAP240 RESTRICTIONS: Open to athletic training majors only.</td>
</tr>
<tr>
<td>KAAP 481</td>
<td>LOWER EXTREMITY AND SPINE EVALUATION</td>
<td>3</td>
<td></td>
<td>Evaluation of the lower extremity, lumbar spine and sacroiliac joint. SOAP format evaluation, on-field evaluation, mechanics and pathomechanics of joint movement, detailed anatomy, etiology of specific injuries and special and stress tests will be discussed. PREREQ: KAAP220 and KAAP240 RESTRICTIONS: Open to athletic training majors only.</td>
</tr>
<tr>
<td>KAAP 483</td>
<td>INJURY CONSIDERATIONS FOR THE FEMALE ATHLETE</td>
<td>3</td>
<td></td>
<td>There are a variety of gender-specific sport-related injuries that involve the female athlete population. Explore gender-specific anatomical, biological, and physiological mechanisms responsible for such injuries and provide specific case studies for discussion. May be crosslisted with WMS5483.</td>
</tr>
<tr>
<td>KAAP 484</td>
<td>WOMEN IN SPORTS</td>
<td>3</td>
<td></td>
<td>Historical and contemporary perspectives on the female athlete, encompassing biological, psychological, sociological, and legal issues that are gender dependent and culturally unique. May be crosslisted with WMS5484.</td>
</tr>
<tr>
<td>KAAP 485</td>
<td>RESEARCH IN EXERCISE SCIENCE</td>
<td>1-3</td>
<td></td>
<td>Undergraduate laboratory research experience in biomechanics, exercise physiology, or motor control. RESTRICTIONS: Restricted to exercise science majors. Requires permission of instructor. May be repeated for up to six credits.</td>
</tr>
<tr>
<td>KAAP 487</td>
<td>RESEARCH IN SPORTS MEDICINE</td>
<td>1-3</td>
<td></td>
<td>Undergraduate laboratory research experience in sports medicine. RESTRICTIONS: Restricted to junior and senior athletic training majors. Consent of instructor required. May be repeated for up to six credits.</td>
</tr>
<tr>
<td>KAAP 488</td>
<td>UPPER EXTREMITY AND SPINE EVALUATION LABORATORY</td>
<td>1</td>
<td></td>
<td>Laboratory exercises to complement the evaluation of the upper extremity, cervical spine and facial injuries. COREQ: KAAP480. RESTRICTIONS: Open to athletic training majors only.</td>
</tr>
<tr>
<td>KAAP 489</td>
<td>LOWER EXTREMITY AND SPINE EVALUATION LABORATORY</td>
<td>1</td>
<td></td>
<td>Laboratory exercises to complement the evaluation of the lower extremity, lumbar spine, sacroiliac joint, posture, and gait analysis. COREQ: HESC481. RESTRICTIONS: Open to athletic training majors only.</td>
</tr>
<tr>
<td>KAAP 601</td>
<td>RESEARCH METHODS</td>
<td>3</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>KAAP 602</td>
<td>DATA ANALYSIS AND INTERPRETATION IN HEALTH SCIENCES</td>
<td>3</td>
<td></td>
<td>Overview of statistical practice in health sciences research, particularly experimental research. Topics include experimental design, regression, analysis of variance including repeated measures designs and nonparametric tests.</td>
</tr>
<tr>
<td>KAAP 603</td>
<td>SEMINAR IN EXERCISE SCIENCE</td>
<td>1 PF</td>
<td></td>
<td>Guest and student presentations on research or other topics related to exercise science.</td>
</tr>
<tr>
<td>KAAP 604</td>
<td>SENSORIMOTOR CHARACTERISTICS OF INJURY</td>
<td>3</td>
<td></td>
<td>Nervous system attributes related to acute injury and overuse syndromes, including mechanoreceptor function, muscle tone and stiffness regulation, dynamic restraint, neuromuscular dyskinesia, and neurocognitive traits. Implications for research and clinical outcomes will be discussed. PREREQ: HESC220 or equivalent</td>
</tr>
<tr>
<td>KAAP 605</td>
<td>PATHOETIOLOGY OF MUSCULOSKELETAL INJURIES</td>
<td>3</td>
<td></td>
<td>Physiological, mechanical, and neuromuscular mechanisms of common musculoskeletal injuries with implications for both clinical and research environments. PREREQ: HESC220 or equivalent RESTRICTIONS: Restricted to graduate students.</td>
</tr>
<tr>
<td>KAAP 606</td>
<td>EVIDENCE-BASED SPORTS MEDICINE</td>
<td>3</td>
<td></td>
<td>Theory and practice of evidence-based sports medicine for both clinical and research environments, with emphasis on understanding results of health care interventions and practices for patients and research subjects.</td>
</tr>
</tbody>
</table>
KAAP 607  MOTOR LEARNING AND CONTROL  3
Exploration of theoretical perspectives of motor learning and control, with a focus on contemporary approaches. Surveys neurological systems involved in perception and motor performance. Application of specific principles of learning and control of movement to the teaching of motor skills in daily living activities, physical education and sport.

KAAP 609  CONCUSION PATHOLOGY & MANAGEMENT  3
In addition to addressing the current controversies surrounding concussions, this course will provide foundation knowledge in concussion pathophysiology, epidemiology, clinical and experimental assessment techniques, post-injury, cognitive and postural deficits, imaging approaches, and cumulative effects and later life neuropathological complications. Students present and discuss contemporary research.

KAAP 615  ADVANCED MAMMALIAN PHYSIOLOGY  4
Systemic mammalian physiology: cellular mechanisms, muscle, cardiovascular, respiratory, renal, digestive and endocrine systems. Emphasizes human physiology and includes discussions of primary literature in the field of physiology research. Crosslisted with BISC605. PREREQ: BISC306 or instructor's approval

KAAP 616  ADVANCED MAMMALIAN PHYSIOLOGY II  4
Continuation of BISC605. Systemic mammalian physiology: respiratory, renal, gastrointestinal, and reproductive systems and metabolism. Crosslisted with BISC606. PREREQ: BISC605.

KAAP 617  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 applications. Involves hands-on use of equipment to collect data for faculty and student research projects.

KAAP 627  BIOMECHANICAL METHODS  3
Introduces students to fundamental methods of two- and three- dimensional analysis in 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: KAAP417 or KAAP617.

KAAP 650  LIFE SPAN MOTOR DEVELOPMENT  3
Theoretical and empirical inquiry into developmental changes in movement patterns across the life span. Focus will be placed on changes in behavioral aspects of human motor behavior and the underlying mechanisms to which these changes relate. Students will design and complete research project.

KAAP 651  NEUROPHYSIOLOGICAL BASIS OF HUMAN MOVEMENT  3
Neural control of human movement, including gradation of muscular force, motor unit control principles, neuromuscular aspects of strength, segmental motor control, the organization of ballistic movements, adaptations in the control of movement, and aging. Students will learn related research techniques through hands-on demonstrations.

KAAP 654  MEDICAL PHYSIOLOGY  3
Survey of medical physiology, including discussion of major body systems with emphasis on system interaction, homeostasis, and pathophysiology. PREREQ: A previous course in mammalian, applied, cell, or exercise physiology.

KAAP 655  ADVANCED PHYSIOLOGY OF EXERCISE  3
Advanced study of the integration of the cardiovascular, pulmonary, metabolic, muscle, and temperature-regulating systems during exercise.

KAAP 665  12 LEAD ECG INTERPRETATION  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.

KAAP 666  SPECIAL PROBLEM  1-12

KAAP 671  CLINICAL EXERCISE PHYSIOLOGY INTERNSHIP  3-12 PF
The purpose of the internship is to provide hands-on experiences in preventive and rehabilitative practices for patients with cardiopulmonary, metabolic, and musculoskeletal diseases as well as apparently healthy and low risk populations. In addition, the experience will help prepare students to take the American College of Sports Medicine (ACSM) clinical exercise physiology registry examination (RCEP) and/or the ACSM clinical exercise specialist certification. PREREQ: KAAP675.

KAAP 675  CLINICAL EXERCISE PHYSIOLOGY  3
Methods of evaluating cardiovascular function through graded exercise tests as well as principles of exercise prescription. Theoretical as well as practical covering of administrative aspects of testing, metabolic calculations, variety of testing protocols, basic exercise physiology and exercise prescription.

KAAP 676  CLINICAL EXERCISE PHYSIOLOGY II  4
Exercise prescription and testing guidelines for special populations other than cardiopulmonary patients. Overview of each condition, recommendations for exercise prescription, effects of exercise on the condition, administration and interpretation of diagnostic tests will be presented. PREREQ: KAAP675.

KAAP 677  ADMINISTRATION AND ORGANIZATION OF CARDIOPULMONARY AND WELLNESS PROGRAMS  3
Instruction on administrative and organizational aspects of the daily operations of cardiopulmonary rehabilitation and other wellness-related programs. The operations of specific programs will be discussed. PREREQ: KAAP675.

KAAP 678  CARDIOPULMONARY PATHOPHYSIOLOGY AND PHARMACOLOGY  3
Comprehensive overview of major causes of cardiac diseases and their effect on cardiovascular function. The role of exercise in the rehabilitation from these cardiac disorders is analyzed and evaluated. Pharmacological intervention for various cardiac conditions are presented as they relate to rehabilitation and treatment. PREREQ: KAAP220 and KAAP310, or permission of instructor.

KAAP 679  PRIMARY PREVENTIVE MEDICINE STRATEGIES  3
Explore risk reduction strategies for primary prevention of chronic diseases such as cardiopulmonary disease, metabolic disorders, and various forms of cancer. PREREQ: KAAP430 or permission of instructor.

KAAP 680  CAPSTONE: CLINICAL EXERCISE PHYSIOLOGY COMPREHENSIVE  3
A capstone course that encompasses classroom, laboratory and clinical experiences that help to define the goals and objectives of the ACSM's Certified Clinical Exercise Physiologist exam and examines a student's readiness to successfully complete the exam. PREREQ: KAAP676.

KAAP 681  EXERCISE TESTING AND PRESCRIPTION CLINICAL COMPETENCIES PORTFOLIO  1 PF
Students will develop a portfolio that demonstrates clinical competencies in graded exercise testing, exercise prescription for apparently healthy and diseased populations, as well as assessment skills for blood pressure measurement, cholesterol testing, body composition analysis, and pulmonary function testing under the direction of the faculty supervisor. The portfolio will be compiled over the course of the 12-month Masters program and will be evaluated by the faculty supervisor. PREREQ: KAAP676.

KAAP 686  MATHEMATICS FOR BIOMECHANICS  3
Mathematical techniques for research in biomechanics and related fields, with emphasis on methods useful for biomedical signal processing. Topics include Fourier analysis, matrix algebra, and signal processing. May be crosslisted with BMSC686. PREREQ: MATH221 and MATH222 or equivalent.

KAAP 687  SEMINAR IN BIOMECHANICS  3
Introduction to contemporary and classical research literature on the biomechanics of human movement with an emphasis on exercise, clinical and sport applications. Lecture/discussion format.

KAAP 688  ELECTROMYOGRAPHIC KINESIOLOGY  3
Introduction to the theoretical basis and practical application of electromyography. Topics include the electromyographical basis of muscle actions, mechanical properties of muscle, EMG recording and processing methods and applications of EMG to the study of human motion.

KAAP 801  GRADUATE SEMINAR IN APPLIED PHYSIOLOGY  0-4 PF
Guests and student research presentations in areas of Applied Physiology.
KAAP 802  HUMAN CARDIOVASCULAR CONTROL  3
Focuses on human cardiovascular control as it pertains to orthostasis, exercise and heat stress. The role of mechanical, neural and humoral factors is emphasized, as well as factors that control oxygen transfer from lungs to cells.
PREREQ: Undergraduate human or exercise physiology at the 200-level or higher

KAAP 808  SEMINAR IN MOTOR BEHAVIOR  3
Introduction to research literature on contemporary theories, models and patterns of motor behavior. Topics include a variety of both motor behavior and motor learning phenomena and processes, their relations with contemporary motor control theory, as well as a possible role of the central nervous system in distinctive behavioral and motor learning patterns.
RESTRICTIONS: Requires permission of instructor.

KAAP 840  ADVANCED HUMAN ANATOMY  3
Laboratory 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.

KAAP 866  SPECIAL PROBLEM  1-12

KAAP 868  RESEARCH  1-12

KAAP 869  MASTER’S THESIS  1-6

KAAP 964  PRE-CANDIDACY STUDY  3-12 PF

KAAP 969  DOCTORAL DISSERTATION  1-12 PF

LATIN AMERICAN STUDIES

LAMS 390  METHODS IN INTERDISCIPLINARY RESEARCH  1 PF
Introduces students to methodologies used by disciplines represented in LAINS. Students will learn about interdisciplinary research in Area Studies, as well as the methods faculty in Anthropology, Art, Art History, Foreign Languages and Literature, Geography, History, Political Science, and Women’s Studies utilize to generate their scholarship.

LAMS 464  INTERNSHIP IN LATIN AMERICAN STUDIES  1-3
On-the-job experience and explore potential occupational areas at associations, non-governmental organizations, foundations, or other venues connected to Latin American history, culture, politics, and society, under joint supervision of Latin American and Iberian Studies Program and sponsoring organization. Completion of journal of activities and/or final academic project or paper.
RESTRICTIONS: Open only to Latin American and Iberian Studies majors and minors.

LAMS 491  LATIN AMERICAN STUDIES CAPSTONE  3
Through intensive research and study of texts and artifacts on a single theme, students will integrate and focus their knowledge of Latin American cultures across several disciplines. Taught in Spanish. Crosslisted with SPAN491. PREREQ: SPAN326.

LATIN

LATN 101  ELEMENTARY LATIN I  3
Prepares students to read ancient Roman literary works in the original language. Discussion of Roman culture and civilization.

LATN 102  ELEMENTARY LATIN II  3
Completion of elementary Latin.
PREREQ: LATN101 or equivalent RESTRICTIONS: One year of high school Latin acceptable in lieu of prerequisite.

LATN 201  INTERMEDIATE LATIN PROSE  3
Introduction to reading Latin literature in the original language, focusing on the philosophical and forensic works of Cicero, the historical writings of Livy, and the letters of Pliny.
PREREQ: LATN101 and LATN102 or equivalent.

LATN 202  INTERMEDIATE LATIN POETRY  3
Readings, in the original language, will be drawn from Vergil’s Aeneid as well as from the works of Ovid and Catullus. Attention will be given not only to review of grammar but also to the socio-political circumstances under which these works were composed.
PREREQ: LATN201 or equivalent. RESTRICTIONS: Satisfies College of Arts and Sciences language requirement.

LATN 221  ROMAN LETTERS  3
Explores the letter as a literary form in the Roman world. Readings from the letters of Cicero and Pliny.
PREREQ: LATN214

LATN 222  HISTORIANS OF THE REPUBLIC  3
Selected readings from the works of Livy, Sallust and Cornelius Nepos.
PREREQ: LATN214

LATN 301  ADVANCED INTERMEDIATE LATIN PROSE  3
Focuses on the works (in the original language) of one or more prose authors with particular attention to interpretative issues such as themes and contemporary intellectual and cultural milieu. Readings drawn from the philosophical, historical, and oratorical works of authors such as Tacitus, Pliny the Elder, Pliny the Younger, Caesar, Cicero, Sallust, and Seneca in rotation or in combination.
PREREQ: LATN202 or equivalent.

LATN 302  ADVANCED INTERMEDIATE LATIN POETRY  3
Focus on the works (in the original Latin) of one or more poets with particular attention to interpretive issues such as themes and contemporary intellectual and cultural milieu. Readings will be drawn from authors such as Lucretius, Tibullus, Propertius, Ovid, Virgil, Ennius, Catullus, Plautus, Terence, and Seneca in rotation and/or in combination.
PREREQ: LATN202 or equivalent.

LATN 366  INDEPENDENT STUDY  1-3

LATN 401  ADVANCED LATIN PROSE  3
Focuses on the works (in the original language) of one or more prose authors with particular attention to interpretative issues such as themes and contemporary intellectual and cultural milieu. Readings drawn from the philosophical, historical, and oratorical works of authors such as Tacitus, Pliny the Elder, Pliny the Younger, Caesar, Cicero, Sallust, and Seneca in rotation or in combination.
PREREQ: LATN301 and LATN302 or equivalent. RESTRICTIONS: Meets with LATN301. May be repeated for credit four times.

LATN 402  ADVANCED LATIN POETRY  3
Focus on the works (in the original Latin) of one or more poets with particular attention to interpretive issues such as themes and contemporary intellectual and cultural milieu. Readings drawn from the philosophical, historical, and oratorical works of authors such as Lucretius, Virgil, Terence, Plautus, Catullus, Ennius, Propertius, Seneca, and Tibullus in rotation and/or combination.
PREREQ: LATN301 and LATN302 or equivalent. RESTRICTIONS: Meets with LATN302. May be repeated for credit four times.

LATN 403  ROMAN LYRIC POETRY  3
Readings in the lyric poetry of Catullus and Horace.
PREREQ: LATN214

LATN 466  INDEPENDENT STUDY  1-3

LATN 601  LATIN PROSE: SELECTED AUTHORS  3
Focuses on the works (in the original language) of one or more prose authors with particular attention to interpretative issues such as themes and contemporary intellectual and cultural milieu. Readings drawn from the philosophical, historical, and oratorical works of authors such as Tacitus, Pliny the Elder, Pliny the Younger, Caesar, Cicero, Sallust, and Seneca in rotation or in combination.
PREREQ: LATN401 or LATN402 or equivalent (three and a half years of Latin at the College level).

LATN 602  LATIN POETRY: SELECTED AUTHORS AND TOPICS  3
Focuses on the works (in the original language) of one or more Latin poets with particular attention to interpretative issues such as themes and contemporary intellectual and cultural milieu. Readings drawn from the works of authors such as Ennius, Catullus, Vergil, Horace, Ovid, and Propertius in rotation or in combination.
PREREQ: LATN401 or LATN402 or equivalent (three and a half years of College level Latin).
LEAD 100 LEADERSHIP, INTEGRITY AND CHANGE 3
Introduces students to the challenges of leadership. An experiential practice-based change project will give students hands-on experience in applying the skills and practices of effective leadership to create positive change.

LEAD 101 GLOBAL CONTEXTS FOR LEADERSHIP 3
Understanding a variety of issues and problems that impact quality of life of individuals and groups and demand effective leadership in global contexts.

LEAD 102 PERSPECTIVES ON LEADERSHIP 1-3
Overview of leadership as an academic discipline and a field of practice. Topics include exploration of career paths, resources for academic success, and opportunities for leadership development. Emphasis on individual and team skills for problem solving.
RESTRICTIONS: Priority given to freshmen.

LEAD 125 DOLLARS AND SENSE 3
An overview of the concepts and skills in personal financial management, including an understanding of how leaders impact the financial environment of individuals, families and communities. Topics include developing financial goals, budgeting, debt, savings, retirement planning and investing in insurance, stocks, bonds, and mutual funds.

LEAD 200 THE LEADERSHIP CHALLENGE 3
Introduces students to the challenge of leadership in an increasingly complex, global, and fast-paced world. Provides theoretical bases of leadership while encouraging students to develop their own leadership potential.

LEAD 209 PRESENTATION STRATEGIES 3
Methods for delivering leadership messages and for developing strategic presentations, with an emphasis on purpose, vision, audience and formats.

LEAD 268 UNDERGRADUATE RESEARCH 1-3
Undergraduate research conducted on or off campus, out of class, and under the supervision of a LEAD faculty member. Students must keep a log of activities, meet regularly with their faculty sponsor, and submit a final report. One credit requires a minimum of 40 hours of research.
RESTRICTIONS: Permission of instructor required.

LEAD 300 LEADERSHIP, CREATIVITY, AND INNOVATION 3
Provides students with the theoretical bases of leadership, creativity, and innovation that inform the effective practice of leadership.

LEAD 337 TOPICS IN POLITICAL COMMUNICATION 1 PF
This lecture series focuses on various thematic issues in political communication and campaign politics. Crosslisted with COMM337. RESTRICTIONS: May be repeated twice for credit.

LEAD 340 LEADERSHIP INTERNSHIP 3-6
An off-campus supervised and coordinated field study in selected agencies and organizations.
PREREQ: LEAD100 RESTRICTIONS: May be repeated once for credit. Requires permission of instructor.

LEAD 341 DECISION-MAKING AND LEADERSHIP 3
The application of different decision-making tools and models for making effective decisions in a leadership context.
PREREQ: LEAD100

LEAD 366 INDEPENDENT STUDY 1-6

LEAD 390 TEACHING ASSISTANT 1-3 PF
Practical teaching experience. Students participate and assist in instruction of an undergraduate LEAD course. Students must work 28 hours for each credit hour.
RESTRICTIONS: Must have a 3.0 GPA, have completed the course for which they assist in good standing, and be available the entire semester. Permission of instructor required.

LEAD 400 LEADERSHIP FOR THE COMMON GOOD 3
Direct action organizing, coalition building, consensus organizing as strategies for mobilizing people to create positive change. Emphasis on social responsibility, sustainability, collaborations, and multisector interactions.
PREREQ: LEAD100, LEAD101.

LEAD 404 LEADERSHIP IN ORGANIZATIONS 3
Building the capability of organizations to develop and operationalize leadership capacity at all levels of an organization. Concepts and theories of organizational effectiveness studied relate to impacts of structure, culture, and other characteristics upon an organization's ability to unleash leadership potential.
PREREQ: LEAD100

LEAD 411 TOPICS IN LEADERSHIP DYNAMICS 1-6
Topics relating to aspects of leadership. Themes in leadership dynamics will be explored.
PREREQ: LEAD100 RESTRICTIONS: This course may be taken more than once for a maximum of 6 credits.

LEAD 419 POLICY LEADERSHIP AND ETHICS 3
Advanced examination of the theory and practice of leadership in public policy, specifically emphasizing ethical issues and implications with and between multiple sectors.
Crosslisted with UAPP419.

LEAD 451 LEADERSHIP FOR SUSTAINABILITY 3
Theoretical foundations, practical challenges and innovations for engaging and fostering sustainability - economic, social, and environmental. Integration with leadership theory and practice, specifically aimed at developing the sustainability leader.
PREREQ: LEAD100 or permission of instructor.

LEAD 466 INDEPENDENT STUDY 1-6

LEAD 468 UNDERGRADUATE RESEARCH 1-3
Undergraduate research conducted on or off campus, out of class, and under the supervision of a LEAD faculty member. Students must keep a log of activities, meet regularly with their faculty sponsor, and submit a final report. One credit requires a minimum of 40 hours of research.

LEAD 490 SENIOR CAPSTONE 3
Engage in a project addressing "real world" leadership challenges. Successful project completion requires integration, synthesis and reflection upon knowledge and skills acquired in previous courses. Specific projects vary by semester.
PREREQ: LEAD100, LEAD341. RESTRICTIONS: Open to senior LEAD majors only.

LEGAL STUDIES

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

LEST 301 INTRODUCTION TO LEGAL STUDIES 3
Introduces legal studies as a multidisciplinary field. May be crosslisted with CRJU301.

LEST 345 LEGAL ISSUES OF THE MASS MEDIA 3
Survey of legal issues affecting the development and performance of the mass media. The foundation of American communications law outlined through the study of First Amendment theory, its origin and development. Legal issues concerning libel, obscenity, copyright and broadcast regulation discussed.
Crosslisted with COMM345.

LEST 380 INTRODUCTION TO LAW 3
Broad overview of the nature, functions and limits of law. Emphasis on law as the political instrument used to regulate, control and promote behavior and deal with social problems.
Crosslisted with POSC380.

LEST 401 SENIOR SEMINAR 3
Culminates the legal studies minor by requiring an independent research project resulting in a term paper. Seminar focuses on a specific substantive issue, provides guidance from professor and chance to share ideas and problems with fellow students.
May be crosslisted with CRJU401, SOC401.

LEST 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.
Crosslisted with ECON408. PREREQ: One of ECON251, ECON255, or ECON300 or ECON301.

LEST 450 TOPICS IN ENVIRONMENTAL LAW 3
Overview of the legal process and environmental laws in order to understand policy issues and learn action processes in the environmental field.
Crosslisted with APEC450.
LING 101  INTRODUCTION TO LINGUISTICS I  3
Nature of language: structure of sounds, words, sentences, and meaning; relationships of language and society, culture, and thought. Emphasis is on language universals and variation both within and between languages, including non-Western and non-white varieties.

LING 102  LANGUAGE, MIND AND SOCIETY  3
Explores the interrelation between language, mind and society. Topics will vary depending on instructor, but may include: origins of language, impact of culture on language and thought, structural aspects of language variation and the mental representation of language, role of universal grammar in language learning, regional and social variation in language, sociolinguistics of multilingual/multiethnic communities, language change, and the role of language in social and political decision making.
May be crosslisted with CGSC102.

LING 201  LANGUAGES INVENTED FOR BOOKS AND FILM  3
Languages like Elvish, Klingon, and Na'vi were created to add depth, richness, and atmosphere to an imagined world. Examines such invented languages and asks what it takes for an invented language to be convincingly authentic.

LING 202  SCIENCE OF LANGUAGE  3
Extension of the study of linguistics begun in LING101. The focus is on formal, scientific aspects of linguistics, specifically articulator phonetics and the IPA transcription system, phonology, morphology and syntax. The course examines linguistic phenomena in English as well as other languages.
PREREQ: LING101.

LING 203  LANGUAGES OF THE WORLD  3
Survey of the world's languages, examining a number of important phenomena from a wide range of languages. Phenomena are both structural (e.g., word order and agreement) and societal or psychological (how multicultural societies choose a common language, the relation between language and thought). May be crosslisted with WOMS222.

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 crosslisted with WOMS222.

LING 253  LABORATORY PHONETICS  3
Study of speech sounds, emphasizing the measurement of the acoustic signal. Introduction to acoustic phonetics, concentrating on the source-filter model of speech production. Computer laboratory projects in speech recording, digitization, analysis, variation, synthesis and perception.
PREREQ: LING101.

LING 265  STUDIES IN LANGUAGE  3-9
See http://primus.rss.udel.edu/CourseSearch/ for topics.
RESTRICTIONS: May be repeated for credit when topics vary.

LING 366  INDEPENDENT STUDY  1-6
LING 466 INDEPENDENT STUDY 1-3

LING 471 DISCOVERING HUMAN LANGUAGE 3
Introduction to field linguistics. Examines how languages are put together through a face-to-face encounter with an unknown language. Determine how this language - and human language in general - is constructed. Explores culture, people and even the food where the language is spoken. May be crosslisted with CGSC471. PREREQ: LING101.

LING 472 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. Crosslisted with EDUC472. RESTRICTIONS: Open only to students in the Cognitive Science major, Elementary Teacher Education major, Linguistics major, or by permission of instructor.

LING 476 SECOND LANGUAGE ACQUISITION AND BILINGUALISM 3

LING 477 THE STRUCTURE OF ENGLISH 3
Explores current generative linguistic theories and the analysis of English phonology/morphology and syntax in the light of these theories. Contrastive analysis of English and a second language (such as Spanish). May be crosslisted with EDUC477, ENGL477. PREREQ: LING101.

LING 480 SOCIOLINGUISTICS 3
Interface between language and contemporary society: theories, research and analytical methods. Topics include: regional dialects; language contact; languages of underrepresented populations, such as ethnic minorities and people with language disabilities; social biases in language assessment; language and culture; language and mass media; language planning and policy development in education and the Official English movement; technology and communication; language attitudes, among others. PREREQ: LING101. RESTRICTIONS: Restricted to Junior and Senior CGSC Majors/Minors and LING Minors.

LING 496 PSYCHOLINGUISTICS 3
Linguistic approaches to cognition, Issues in the relation of language to thought, universals, language acquisition, and theories of syntactic and semantic processing. Crosslisted with CGSC496. PREREQ: LING101.

LING 499 ISSUES IN TEACHING ENGLISH LANGUAGE LEARNERS 3
Addresses theoretical and instructional issues related to teaching English Language Learners (ELLs). Topics include issues in bilingual education, theories of L2 acquisition, ELL educational models, integrating language and content instruction, documentation and assessment of ELL skills, and understanding cultural diversity.

LING 601 HISTORICAL LINGUISTICS 3
Examines how languages evolve over time and how present and past languages are related to each other. Students learn techniques of historical analysis, such as the comparative method, and what is known about the historical development of major linguistic families like the Indo-European family of languages. May be crosslisted with

LING 603 INTRODUCTION TO PHONOLOGY 3
Basic introduction to phonology, concentrating on principles of articulatory phonetics, the IPA transcription system, distinctive feature theory, phonological analysis, and phonological rules.

LING 604 STRUCTURE OF LANGUAGE 3
Introduction to the Structure of Language, concentrating on morphology and syntax. Analysis and theories of how morphemes and words are put together to create larger and larger units.

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 Principles and Parameters 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 618 MEANING AND LANGUAGE USE 3
A graduate introduction to theories of meaning based on the notion of truth and their application to language use. May be crosslisted with CGSC618.

LING 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.

LING 622 LANGUAGE SYLLABUS DESIGN 3
Study of approaches to language syllabus design and materials development, including grammatically sequenced, situational, notional-functional, and task-based approaches. Topics: materials development, textbook evaluation and adaptation, design and implementation of learning units for second-language special purpose and bilingual learners.

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. Practice in item construction and analysis.

LING 644 FIRST LANGUAGE DEVELOPMENT 3
Explores how humans acquire a language in infancy: innate versus environmental factors; the development of grammatical competence and its relation to cognitive and communicative development; cultural and societal influences; development disorders.

LING 651 LOGICAL STRUCTURES IN LANGUAGE 3
Prior mathematics knowledge not assumed. Mathematical introduction to phonology, syntax, and semantics. Elementary and advanced material on logic, sets, functions, relations, and trees.

LING 655 COMPUTATIONAL LINGUISTICS 3
Natural language can be studied from a computational perspective. Course content includes aspects of formal language theory, model theory, formal grammars, computational complexity, and computational learning theory as it pertains to natural language syntax, semantics, morphology, and phonology. May be crosslisted with CGSC655.

LING 671 DISCOVERING HUMAN LANGUAGE 3
Introduction to field linguistics. Examines how languages are put together through a face-to-face encounter with an unknown language. Determine how this language - and human language in general - is constructed. Explores culture, people and even the food where the language is spoken. May be crosslisted with CGSC671.

LING 672 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. Crosslisted with EDUC672.

LING 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. Crosslisted with EDUC675.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LING 676</td>
<td>SECOND LANGUAGE ACQUISITION AND BILINGUALISM</td>
<td>3</td>
<td>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 crosslisted with EDUC676.</td>
</tr>
<tr>
<td>LING 677</td>
<td>THE STRUCTURE OF ENGLISH</td>
<td>3</td>
<td>Explores current generative linguistic theories and the analysis of English phonology/morphology and syntax in the light of these theories. Contrastive analysis of English and a second language (such as Spanish). May be crosslisted with EDUC677, ENGL677.</td>
</tr>
<tr>
<td>LING 680</td>
<td>SOCOULINGUISTICS</td>
<td>3</td>
<td>Interface between language and contemporary society: theories, research and analytical methods. Topics include: regional dialects; language contact; languages of underrepresented populations, such as ethnic minorities and people with language disabilities; social biases in language assessment; language and culture; language and mass media; language planning and policy development in education and the Official English movement; technology and communication; language attitudes, among others.</td>
</tr>
<tr>
<td>LING 691</td>
<td>SEMANTICS I</td>
<td>3</td>
<td>Introduction to the English language and logic of meaning. Survey of the semantic issues in reference, ambiguity, presupposition and implication. Selected linguistic phenomena (e.g., tense, aspect, predication and thematic roles). Some elements of formal semantics.</td>
</tr>
<tr>
<td>LING 696</td>
<td>PSYCOULINGUISTICS</td>
<td>3</td>
<td>Study of linguistic approaches to cognition. Issues in the relation of language to thought: universals, language acquisition and theories of syntactic and semantic processing. Crosslisted with CGSC696.</td>
</tr>
<tr>
<td>LING 699</td>
<td>ISSUES IN TEACHING ENGLISH LANGUAGE LEARNERS</td>
<td>3</td>
<td>Addresses theoretical and instructional issues related to teaching English Language Learner (ELL) students. Topics include issues in bilingual education, theories of L2 acquisition, methods of teaching ELLs, L2 testing, educational models, integrating language and content instruction, documentation and assessment of ELL skills, and role of cultural diversity in classrooms.</td>
</tr>
<tr>
<td>LING 801</td>
<td>LINGUISTIC TYPOLOGY</td>
<td>3-6</td>
<td>Introduction to the concerns of linguistic typology and the study of language universals and language documentation. COREQ: LING607, LING609.</td>
</tr>
<tr>
<td>LING 802</td>
<td>SPECIAL TOPICS IN OLD &amp; MIDDLE ENGLISH</td>
<td>3</td>
<td>A study of the English language either from before 1100 or between 1100 and 1400 with selected readings in Old or Middle English poetry and prose. Crosslisted with ENGL802. RESTRICTIONS: May be repeated once for credit when topics vary.</td>
</tr>
<tr>
<td>LING 830</td>
<td>SYNTAX III</td>
<td>3</td>
<td>In-depth investigation of syntactic universals and recent developments in the theory of syntax. PREREQ: LING610. RESTRICTIONS: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>LING 831</td>
<td>TOPICS IN SYNTAX</td>
<td>3</td>
<td>Current topics in syntactic theory, problems in the syntactic analysis of specific languages. PREREQ: LING830 RESTRICTIONS: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>LING 832</td>
<td>THE ACQUISITION OF SYNTAX</td>
<td>3</td>
<td>Current issues in the acquisition of syntax, such as: relationship between UG and specific language grammars, parameter setting model in L1 acquisition, effect of input frequency, methods for assessing children's syntax. PREREQ: Syntax I and II, or concurrent enrollment in Syntax II.</td>
</tr>
<tr>
<td>LING 848</td>
<td>SEMINAR IN LANGUAGE DEVELOPMENT</td>
<td>3</td>
<td>Covers aspects of semantic, syntactic and phonological development through examination of current research and theory in the field. Treats educational implications of language development. Crosslisted with EDUC848.</td>
</tr>
<tr>
<td>LING 851</td>
<td>LINGUISTIC FIELD METHODS</td>
<td>3</td>
<td>Development of skills and techniques in various kinds of field analysis. Use of native informants. Discussion of the relationship between data collecting and grammatical statement.</td>
</tr>
<tr>
<td>LING 855</td>
<td>ADVANCED COMPUTATIONAL LINGUISTICS</td>
<td>3</td>
<td>This is an advanced course in computational linguistics addressing advanced topics in formal language theory, model theory, formal grammars, computational complexity, and computational learning theory as it pertains to natural language syntax, semantics, morphology, and phonology. May be crosslisted with CGSC655. PREREQ: LING655, CGSC655, or permission of instructor.</td>
</tr>
<tr>
<td>LING 861</td>
<td>TOPICS IN PHONOLOGY</td>
<td>3</td>
<td>Detailed examination of one or more current (controversial) issues in phonological theory. PREREQ: LING608. RESTRICTIONS: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>LING 862</td>
<td>ACQUISITION OF PHONOLOGY</td>
<td>3</td>
<td>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</td>
</tr>
<tr>
<td>LING 863</td>
<td>PROJECTS IN ACOUSTIC PHONETICS</td>
<td>3</td>
<td>Brief review of the articulatory, acoustic, and perceptual characteristics of speech and computer-based laboratory instrumentation. Students conduct research projects in acoustic phonetics, speech analysis, or speech synthesis. Projects will be suggested by the instructor, however, students may (with instructor’s approval) choose a project of their own design.</td>
</tr>
<tr>
<td>LING 890</td>
<td>STUDIES IN LINGUISTICS</td>
<td>3-9</td>
<td>Varying topics in linguistics, such as grammatical theory, grammatical analysis, syntax, historical-comparative linguistics, stylistics and grammar testing. May be crosslisted with CGSC890, ENGL890. RESTRICTIONS: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>LING 892</td>
<td>READINGS IN LINGUISTICS</td>
<td>0 PF</td>
<td>Meetings for working groups in linguistics to discuss readings, present current research, and discuss new research directions.</td>
</tr>
<tr>
<td>LING 895</td>
<td>COLLOQUIUM</td>
<td>0 PF</td>
<td>A series of talks by invited speakers in Linguistics and Cognitive Science.</td>
</tr>
<tr>
<td>LING 964</td>
<td>PRE-CANDIDACY STUDY</td>
<td>3-12 PF</td>
<td>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.</td>
</tr>
<tr>
<td>LING 969</td>
<td>DOCTORAL DISSERTATION</td>
<td>1-12 PF</td>
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</tbody>
</table>
LLCU 107  MODERN LANGUAGE III - INTERMEDIATE  4
Review of grammar, continued practice in speaking and writing, and reading texts of average difficulty.
PREREQ: FL1108  RESTRICTIONS: Satisfies Arts and Sciences foreign language requirement.

LLCU 110  FIRST YEAR SEMINAR  3
Introduction to the study of language, literature, and the cultures that produce them. Specific subject matter varies.

LLCU 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.
Crosslisted with ENGL202.  PREREQ: ENGL110.

LLCU 203  LANGUAGES OF THE WORLD  3
Survey of the world's languages, examining a number of important phenomena from a wide range of languages. Phenomena are both structural (e.g., word order and agreement) and societal or psychological (how multicultural societies choose a common language, the relation between language and thought).
Crosslisted with LING203.

LLCU 309  POLITICAL CULTURE BY COUNTRY  3
Introduction to the political and civic cultures underpinning and supporting different political systems. Topics may vary from year to year. Crosslisted with POSC309.  RESTRICTIONS: Offered only in conjunction with travel abroad programs. May be taken twice for credit when countries vary.

LLCU 316  CLASSICAL MYTHOLOGY: GODS, HEROES, AND MONSTERS  3
Cosmological myths and heroic sagas in the literature and art of Greece and Rome. The influence of the mythology in later art and literature.

LLCU 319  TOPICS: FRENCH LITERATURE IN TRANSLATION  3
Study of the works of one or more outstanding authors or of a special theme. Taught in English. Topics vary and are announced prior to the registration period.

LLCU 320  VARYING AUTHORS, GENRES  3
Cultural, especially cross-cultural and/or interdisciplinary studies with primary emphasis on the aesthetic context of the announced topic, e.g., Nordic Saga and Myth; Courtly Love; and the European Postwar Novel.
RESTRICTIONS: May be repeated for credit when topics vary.

LLCU 321  TOPICS: CHINESE LITERATURE IN TRANSLATION  3
Study of the works of one or more outstanding authors or of a special theme. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics.
RESTRICTIONS: May be repeated for credit when topics vary.

LLCU 322  TOPICS: CLASSICAL LITERATURE IN TRANSLATION  3
Special topics in Greek and Roman culture and civilization. Particular areas and writers to be announced, respectively, ancient epic, ancient drama, Greek literature in translation.
RESTRICTIONS: May be repeated for credit when topics vary.

LLCU 325  TOPICS: GERMAN LITERATURE IN TRANSLATION  3
Study of the works of one or more outstanding authors or of a special theme. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics.
RESTRICTIONS: May be repeated for credit when topics vary.

LLCU 326  TOPICS: HISPANIC LITERATURE IN TRANSLATION  3-12
Study of the works of one or more outstanding authors or of a special theme. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics.
RESTRICTIONS: May be repeated for credit when topics vary.

LLCU 327  TOPICS: RUSSIAN LITERATURE IN TRANSLATION  3
Study of the works of one or more outstanding authors or of a special theme. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics.
RESTRICTIONS: May be repeated for credit when topics vary.

LLCU 328  TOPICS: JAPANESE LITERATURE IN TRANSLATION  3-6
Study of the works of one or more outstanding authors or of a special theme. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics.
RESTRICTIONS: May be repeated for credit when topics vary.

LLCU 329  TOPICS: ITALIAN LITERATURE IN TRANSLATION  3
Study of the works of one or more outstanding authors or of a special theme. Taught in English.
RESTRICTIONS: May be repeated for credit when topics vary.

LLCU 330  VARYING AUTHORS, THEMES, AND MOVEMENTS  3
Cultural, especially cross-cultural, study with primary emphasis on the historical development of the announced area, e.g., The Faust Theme in Western Literature, Dante Through the Ages, Don Juan, and the Transformation of a Myth. See http://primus.nss.udel.edu/CoursesSearch/ for topics.
RESTRICTIONS: May be repeated three times for credit when topics vary.

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

LLCU 332  TOPICS: ARABIC LITERATURE IN TRANSLATION  3
Explores special topics in Arabic literature, particular themes and writers to be announced, e.g., The Thousand and One Nights, Arab women writers, Iraqi women’s fiction, war novels.

LLCU 333  ISRAELI FILM: REFLECTING DRAMATIC CHANGE  3
Inquiry into Israeli films from the immediate postwar period to present. Historical and societal changes emphasized. Aesthetic and technical elements of film production and reception featured. Discussion intensive.

LLCU 335  ISRAELI LITERATURE: IDENTITY, GLOBALIZATION AND CONFLICT  3
Through analysis of leading Israeli authors’ literary works, this course explores major themes pertaining to Israeli society’s contemporary character. Surveyed topics include Zionism and post-Zionism; Globalization; Jewish and Non-Jewish citizens of Israel; the Israeli military's influence on civilian life; personal trauma; terrorism and its effects on national life.

LLCU 337  BRAZIL THROUGH FILM  3
Examines Brazilian culture and history through film, film techniques and movements. Other disciplines will help provide an understanding of Brazilian film, including history, literature, gender studies, sociology, cultural studies, politics, and ethnic studies. Topics include religion, gender issues, ethnicity, migration, identity, music, and popular culture. Taught in English. Portuguese films have English subtitles.

LLCU 338  LIGHT AND SHADOW—JAPANESE FILMS  3
Inquiry into Japanese films from the immediate postwar period to present. Both aesthetic and technical elements of film production and reception featured. Discussion intensive.

LLCU 345  MODERN ISRAEL: HISTORY AND CULTURE  3
Many factors contribute to a diverse and intriguing Israeli society. Topics include the roots of Zionism, the concept of the Israeli Sabra, the effects of the Holocaust, ethnic groups and the Arab-Israeli conflict, through history, film, literature, and music.

LLCU 350  INTRODUCTION TO GAME STUDIES  3
Examine the major genres of videogames produced around the world, and major critical approaches taken by academics to the study of those games. Issues for discussion may include the dominance of console platforms in some markets and PC gaming in others; ethics and violence in games; representations of gender and race; processes of immersion and identification in different game types; and the effect of increasingly realistic environments and cinematic.

LLCU 351  VIDEOGAMES AND JAPANESE CULTURE  3
Examines Japanese videogames from both a ludological and narratological perspective. Genres studies include the JRPG, stealth action, simulation and fighting games.

LLCU 352  VIDEOGAMES AND LATIN AMERICAN CULTURE  3
Explores the relationship between videogames and culture by analyzing both in-game cultural representation and the real-life economic, political and societal effects of games across Latin America.

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

LLCU 366  INDEPENDENT STUDY  1-6
LLCU 375  TOPICS: RUSSIAN AND SOVIET CULTURE IN TRANSLATION  3
Special topics in Russian and Soviet culture. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics.
RESTRICTIONS: May be repeated for credit when topics vary.

LLCU 380  TOPICS: JAPANESE CULTURE IN TRANSLATION  3
Special topics in Japanese culture. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics.
RESTRICTIONS: May be repeated for credit when topics vary.

LLCU 383  CHINESE CULTURE IN TRANSLATION  3
Special topics in Chinese culture. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics.
RESTRICTIONS: May be repeated for credit when topics vary.

LLCU 390  HONORS COLLOQUIUM  3
First year interdisciplinary Honors seminar. May be team taught. Specific topics vary.
RESTRICTIONS: Open to first year Honors students only.

LLCU 401  HISTORICAL LINGUISTICS  3
Examines how languages evolve over time and how present and past languages are related to each other. Students learn techniques of historical analysis, such as the comparative method, and what is known about the historical development of major linguistic families like the Indo-European family of languages. Crosslisted with LING401. PREREQ: LING101.

LLCU 420  TOPICS IN ITALIAN LITERATURE  3
Examine diverse Italian authors and literary movements. Hone critical thinking skills while developing the tools necessary for perspective literary and cultural analysis.
RESTRICTIONS: May be repeated three times for credits.

LLCU 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 demonstrations and practical exercises.

LLCU 422  LANGUAGE SYLLABUS DESIGN  3
Study of approaches to language syllabus design and materials development, including grammatically sequenced, situational, notional-functional and task-based approaches. Topics: materials development, textbook evaluation and adaptation, design and implementation of learning units for second-language special purpose and bilingual learners. Includes faculty supervised 25 hours of observation in high school classrooms.

LLCU 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.

LLCU 425  TECHNOLOGY-ENHANCED LANGUAGE LEARNING  3
Study of the practical and theoretical aspects of using technology in second language learning. It is open to teachers of all foreign languages and will be taught in English.
RESTRICTIONS: Open to teachers of foreign languages.

LLCU 429  METHODS OF TEACHING FOREIGN/SECOND LANGUAGES IN ELEMENTARY SCHOOLS  3
Familiarizes students with appropriate teaching methods and techniques for the elementary foreign language classroom. Includes demonstrations by experienced FLES teachers, peer-analysis of video-taped model lessons prepared by participants, and an introduction to testing, materials and course design.

LLCU 430  TOPICS IN ITALIAN CULTURE AND CIVILIZATION  3
Study diverse elements of Italian cultural and civilization, while enhancing writing skills and cultural awareness.

LLCU 436  POLITICS AND LITERATURE  3
Explores the contributions of literature - in various forms including the literary genre of film - to the study of politics. Facilitates a better understanding of national or international politics through the voices of acclaimed authors. Regional or temporal focus will vary.
Crosslisted with POSC436. RESTRICTIONS: May be repeated once for credit when topics/countries differ.

LLCU 466  INDEPENDENT STUDY  1-6

LLCU 475  VARYING TOPICS: LITERARY CRITICISM IN A FOREIGN LANGUAGE CONTEXT  3
Overview of literary criticism with special emphasis on criticism important to French, Spanish, Italian, Russian and German literatures. May be organized as an historical survey or as a survey of a particular period, including the contemporary period. PREREQ: A 300-level survey of literature course in French, Spanish, Italian, Russian, or German

LLCU 490  ONE WORLD: CINEMATIC PERSPECTIVES ON CULTURAL DIVERSITY  3
A seminar entailing an intense multi-cultural/global-culture immersion via the medium of film. Comprises a synthetic, reflective analysis of international films and various ethical, social, and political issues they address.

LLCU 491  FOREIGN LANG EDUCATION CAPSTONE  3
This course, which accompanies the student teaching placement, constitutes a forum in which student teachers reflect on their experiences, interact with peers and supervisors, and complete teaching portfolios in which they demonstrate their ability to effect and assess student learning and to cultivate professional partnerships.
PREREQ: Completion of all coursework and clinical experiences required for admission to student teaching. COREQ: EDUC 400--Student Teaching.
RESTRICTIONS: Requires permission of instructor.

LLCU 495  ONE WORLD: LITERARY PERSPECTIVES ON CULTURAL DIVERSITY  3
A capstone seminar entailing an intense multi-cultural/global-culture immersion via the medium of literature. Comprises a synthetic, reflective analysis of international works of literature and the various ethical, social, and political issues they address.
RESTRICTIONS: This capstone course is designed for Foreign Languages and Literatures Majors in their Senior year of study.

LLCU 601  HISTORICAL LINGUISTICS  3
Examines how languages evolve over time and how present and past languages are related to each other. Students learn techniques of historical analysis, such as the comparative method, and what is known about the historical development of major linguistic families like the Indo-European family of languages. Crosslisted with LING601.

LLCU 620  TOPICS IN ITALIAN LITERATURE  3
Examine diverse Italian authors and literary movements. Hone critical thinking skills while developing the tools necessary for perspectve literary and cultural analysis.

LLCU 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.

LLCU 622  LANGUAGE SYLLABUS DESIGN  3
Study of approaches to language syllabus design and materials development, including grammatically sequenced, situational, notional-functional and task-based approaches. Topics: materials development, textbook evaluation and adaptation, design and implementation of learning units for second-language special purpose and bilingual learners.

LLCU 623  PRINCIPLES OF FOREIGN LANGUAGE  3
Current perspectives on foreign language instruction and extensive hands-on experience with the implementation of effective language teaching strategies. Emphasis given to the enhancement of students’ proficiency in class planning, syllabus design and materials preparation.
RESTRICTIONS: Graduate students only.

LLCU 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. Practice in item construction and analysis.

LLCU 625  TECHNOLOGY-ENHANCED LANGUAGE LEARNING  3
Study of the practical and theoretical aspects of using technology in second language learning. It is open to teachers of all foreign languages and will be taught in English.
PREREQ: FLLT621 or FLLT623. RESTRICTIONS: Open to teachers of foreign languages.
LLCU 626 FOREIGN LANGUAGE PEDAGOGY RESEARCH SEMINAR 3
This course is an in-depth exploration of topics pertaining to the acquisition of a second or additional language. Class readings and assignments will provide students with an introduction to quantitative and qualitative research methods in Applied Linguistics. Emphasis is given to the development of independent study, problem-solving, research, reading, writing and oral presentation skills.

LLCU 629 METHODS OF TEACHING FOREIGN/SECOND LANGUAGES IN ELEMENTARY SCHOOLS 3
Appropriate teaching methods and techniques for the elementary foreign language classroom. Includes demonstrations by experienced FLES teachers, peer-analysis of video-taped model lessons prepared by participants, and an introduction to testing, materials and course design.

LLCU 630 TOPICS IN ITALIAN CULTURE AND CIVILIZATION 3
Study diverse elements of Italian cultural and civilization, while enhancing writing skills and cultural awareness.

LLCU 675 VARYING TOPICS: LITERARY CRITICISM IN A FOREIGN LANGUAGE CONTEXT 3
Overview of literary criticism with special emphasis on criticism important to French, Spanish, Italian, Russian and German literatures. May be organized as an historical survey or as a survey of a particular period, including the contemporary period.

LLCU 677 THEORY OF TRANSLATION 3
Explores the history, philosophy, theory, institution, and practice of translation both as a trans-linguistic art and as a craft. It provides a historical overview of the genre of translation theory, discussing a diverse range of ideas, philosophies, and critical issues in translation theory, translation studies, and translation practice.

LLCU 678 TECHNICAL COMMUNICATION AND WRITING 3
Develop technical writing skills that draw on a variety of styles, and for a number of purposes. Students will develop several techniques for evaluating and presenting data, as well as effective letters and technical proposals.

LLCU 680 COMPARATIVE STUDY OF CHINESE AND ENGLISH 3
A systematic comparison of the Chinese and English languages both from a macro and micro perspective. The course objective is to provide a better understanding of the syntactic and semantic structures of the two languages to enable students to handle more competently problems often encountered in the translation process.

LLCU 868 RESEARCH 1-12

LIBERAL STUDIES

MALS 600 NATURE AND HUMAN NATURE 3
Addresses the development, status, and understanding of humanity within a larger context: e.g., how writers in various disciplines have defined humanity, nature, and the relationship between the two; or the interaction between humans and our environment.

MALS 601 GRADUATE RESEARCH AND WRITING 1
Part of a three-credit gateway experience for incoming students. Students will learn the conventions and expectations of graduate-level writing and research, including the formulation and development of independent research projects and the use of online databases.

MALS 602 TOPICS IN LIBERAL STUDIES I 1
Part of a three-credit gateway experience. Students will explore a liberal-studies topic typical of those taught in other MALS courses. The content will be interdisciplinary and/or intercultural, and the course methodology will include discussion, independent research, and varied forms of academic writing.

MALS 603 TOPICS IN LIBERAL STUDIES II 1
Part of a three-credit gateway experience. Students will explore a liberal-studies topic typical of those taught in other MALS courses. The content will be interdisciplinary and/or intercultural, and the course methodology will include discussion, independent research, and varied forms of academic writing.

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.”

MALS 611 DOCUMENTARY 3
Explores nonfiction narratives using print, film, and/or online models. Includes social reporting, analogues between literary and cinematic techniques, and analyses of the ways in which documentary both reflects and helps to shape its ambient culture. May include documentary-making.

MALS 617 THE ARTS IN CONTEXT 3
Explores the ways in which the arts — e.g., music, dance, art, architecture, performance, and/or decorative arts — both reflect and help to shape their social and historical backgrounds.

MALS 619 THE SCIENTIST IN SOCIETY 3
Scientific research is directly influenced by the society in which it is conducted. In addition to financial limitations, constraints are imposed by societal norms of what are acceptable topics and procedures for research. Focus on the philosophical basis of science as well as consequences to society of the scientific revolution.

MALS 620 THE USE OF SCIENCE IN PUBLIC DISCOURSE 3
Examines important questions of general interest to both individuals and to governmental bodies that depend heavily on scientific information.

MALS 621 WHEN CULTURES MEET 3
Seeks an understanding of the dynamics that occur when one culture comes into contact with another. Examples include the arrival of a new group in a previously homogeneous culture, immigration, racial or ethnic profiling, and cultural assimilation.

MALS 622 INTERPRETING THE PAST 3
Applies a variety of interdisciplinary perspectives, e.g., archaeology, anthropology, history, literature, philosophy, and religion to explain how and what we learn about the past.

MALS 624 WRITING IN LIBERAL STUDIES 3
Provides instruction and practice in the various kinds of writing students may wish to do in the course of the MALS program and beyond. Focuses on one or more specific genres, such as the writing of poetry, fiction, memoirs, or research papers.

MALS 625 FILM AND SOCIETY 3
Explores the ways in which films produced within one or more cultures or time periods both reflect and help to shape their social and historical backgrounds. May include the making of films that include this social/historical perspective. May be repeated twice when topics vary.

MALS 626 STUDIES IN CONTEMPORARY CULTURE 3
Addresses contemporary problems and movements from a multidisciplinary perspective. Examples include artistic, literary, or sociological movements; religious or ethical questions; and political or global issues. RESTRICTIONS: May be taken twice when topics vary.

MALS 627 STUDIES IN MATERIAL CULTURE 3
Examines the use and development of artifacts and their impact on culture and society. Examples include the history and importance of such objects as cuisine and textiles; and the use of artifacts to understand the past, the belief systems of different cultures, and social evolution.

MALS 628 TEXTS IN TIME AND CONTEXT 3
A multidisciplinary interpretation of print and/or nonprint texts within the cultures of specific periods — e.g., the Renaissance, the Jazz Age, or the 1960s. Texts may reflect historical, literary, philosophical, religious, political, sociological, scientific, or other perspectives.

MALS 630 HUMAN RIGHTS AND LIBERTIES 3
Explores such topics as intellectual freedom, free speech, freedom of religion, criminal justice, political systems, and philosophical or religious interpretations of inherent human rights.
MALS 640 RELIGION AND FILM 3
Explore some basic materials native to several religions, and watch one or two films which approach those religions from a variety of standpoints. Discuss Hinduism, Daoism, Native American Religion, Buddhism, Judaism, and Christianity. Films we will watch will include The Legend of Bagger Vance, Gandhi, Being There, Avatar, Kundun, Little Buddha, The Emerald Forest, Trading Places, Last Temptation of Christ, and Life of Brian, among others.

MALS 648 ENVIRONMENTAL ETHICS 3
Ethical problems associated with environmental protection, local, national, and international. Relations to social and political movements. Seminar format. Crosslisted with PHIL648.

MALS 660 ON BECOMING HUMAN 3
Examines the biological and cultural evolution of humans, focusing on similarities and differences between humans and our closest primate relatives.

MALS 800 RESEARCH SEMINAR 3
Students who elect not to do a thesis (MALS869) or project (MALS879) take this course to fulfill their MALS research requirement. Each section of this course will focus on a broad area of study within which students will write substantial research papers.
REQUIREMENTS: Completion of 27 credits of coursework toward the MALS degree. Students may take the last 3 of the required 27 credits of MALS coursework concurrently with the Research Seminar.

MALS 869 MASTER’S THESIS 1-6
REQUIREMENTS: Open only to matriculated MALS students who have completed 24 hours of coursework toward the degree with a cumulative grade point average of 3.0 or higher.

MALS 879 PROJECT 1-6
REQUIREMENTS: Open only to matriculated MALS students who have completed 24 hours of coursework toward the degree with a cumulative grade point average of 3.0 or higher.

MARINE STUDIES

MAST 100 MARINE SCIENCE COLLOQUIUM I 2
Broad introduction to academic life at the University of Delaware and the breadth of contemporary marine science research conducted in the field; core aspects of biological, physical, chemical and geological marine science; and introduces potential research and career tracks.
REQUIREMENTS: Open to Marine Science majors in the fall semester of their freshman year.

MAST 101 MARINE SCIENCE COLLOQUIUM II 1
Continues the first year seminar series in Marine Science. Themes include an exploration of non-academic career tracks, introductory readings of hot-topics in marine science, and a subunit on horseshoe crab biology, culminating in an evening spawning survey on one of the Delaware Bay beaches, or other field experience.
REQUIREMENTS: Primarily intended for Marine Science Majors in the second semester of their freshman year.

MAST 120 LIFE’S BEACH: GEOLOGICAL PROCESSES & LIVING WITH THE COAS 3
Introduction to geology of the coast. "Reading" beaches by geological phenomenon and physical processes. Historical and contemporary analysis of how populations have chosen to live with or against the natural dictates of the shore with costly and tragic consequences. One-day field trip required. Crosslisted with GEO1120.

MAST 132 SCUBA 2
Prepares students with the skills and knowledge necessary to continue their training for open water scuba certification. Crosslisted with BHAN132.

MAST 200 THE OCEANS 3
Integrates physical, chemical, geological and biological principles into an overview that addresses why and how the oceans work. Draws heavily on current ocean issues to illustrate processes and problems.
REQUIREMENTS: Open only to non-science majors or with permission from instructor.

MAST 201 MARINE SCIENCE COLLOQUIUM III 1
Builds on previous colloquia in Marine Science. Course themes include a subunit on pursuing internships and research, discussions of current topics in Marine Science and working with datasets from marine research.
REQUIREMENTS: Primarily intended for Marine Science majors in the Fall of their sophomore year.

MAST 215 FULL OF HOT AIR UNDERSTAND CLIMATE CHG 3
Understanding climate and climate change is important for everyone. Explores climate change and its impacts at local, regional, and global levels. Policy and decision making, as well as adaptation and mitigation will be discussed with a focus on current events. May be crosslisted with GEOG215, GEOL215.

MAST 301 JUNIOR MARINE SCIENCE SEMINAR 1
The final Marine Science Colloquium which focuses on the next steps beyond the undergraduate degree, including pursuit of graduate school opportunities, networking for jobs, resumes, CVs and cover letters. Involves student-led discussions of peer-reviewed literature.
REQUIREMENTS: Primarily intended for Marine Science majors in their junior year.

MAST 314 COMPARATIVE TERRESTRIAL AND MARINE ECOLOGY 3
Comparative overview of similarities and dissimilarities of life in terrestrial and marine environments. Topics include geological history, subsistence, growth and development, life history, reproduction, dispersal, population regulation, and impact of humans. Crosslisted with ENWC314. PREREQ: BISC208.

MAST 315 IT'S IN THE PAST 3
Gain an understanding of the geological record of climate change allowing them to put into context modern-day global warming. Participate in hands-on exercises involving scientific data and figures.
PREREQ: CHEM103, CHEM107 or CHEM111; MATH100 or MATH114.

MAST 341 CLIMATE AND CLIMATE CHANGE 3
Understanding the earth’s climate and how the climate is changing is a fundamental part of modern earth system science. Explores the scientific basis for the study of climate and climate change, including long term and modern change, with a discussion of current topics.
Crosslisted with GEOG341.

MAST 365 OCEAN MATTERS 3
Examines important natural processes and human dimensions influencing ocean and coastal regions including global climate change, ocean acidification, sea level rise, ocean drilling, overfishing, ocean pollution, dead zones, dying coral reefs, and oceans and human health.
PREREQ: MAST200 or equivalent.

MAST 366 INDEPENDENT STUDY 1-6

MAST 382 INTRODUCTION TO OCEAN SCIENCES 3
This is a quantitative introduction to sub-fields within ocean sciences including marine geology, marine chemistry, ocean physics, coastal oceanography and marine biology. An introduction to the major for Marine Sciences and an in-depth overview for those with a minor or concentration in Marine Science.
PREREQ: MATH241 or MATH221; CHEM103, CHEM107 or CHEM111; PHYS201 or PHYS207.

MAST 402 PHYSICAL OCEANOGRAPHY 3
Geographic and hydrodynamic aspects of oceanography. Geography of ocean basins; physical properties of seawater; radiation; and observed distributions of temperature, salinity, oxygen, and currents. Scalar and vector fields; hydrostatics; kinematics, momentum dynamics, vorticity dynamics, viscous flow and eddy flux.
REQUIREMENTS: Requires permission of instructor.

MAST 407 RESEARCH EXPERIENCE IN BIODIVERSITY 4
Hands-on experience in marine science research, from hypothesis development through field and laboratory data collection, analysis, and presentation of results. Research questions centered on physical and biological aspects of coastal biodiversity. Recommended for Lewes Semester in Residence students.
REQUIREMENTS: This course is restricted to students participating in the Semester in Residence program on the University of Delaware’s Hugh R. Sharp Campus in Lewes.

MAST 408 HEAT AND LIGHT IN NATURE - RADIATIVE TRANSFER 3
The energetic interaction of sunlight with the atmosphere and oceans influences the entire earth system. Examines the theory of radiative transfer within the ocean and atmosphere, and then explores several areas of applicable research including climate modeling and remote sensing. May be crosslisted with GEOG408.

MAST 409 THE OCEAN & CLIMATE VARIATION 3
Study of the ocean-atmosphere system; the fluxes of heat, water and energy in the ocean and interchanges with the atmosphere; budgets and mechanisms of exchange; and interannual and long-term climate variations as related to the ocean. This course satisfies the second writing requirement in the College of Earth, Ocean, and Environment.
May be crosslisted with GEOG409.
MAST 410 SCIENTIFIC DIVING 3
Introduction to scientific SCUBA diving techniques. Completion of will certify the student as an American Academy of Underwater Sciences (AAUS) Scientific Diver and allow eligibility to participate in UD diving projects with reciprocity with other universities and government agencies.
RESTRICTIONS: Must have completed PADI Open Water Certification.

MAST 413 METEOROLOGICAL PROCESSES FOR WIND ENERGY 3
Explores the fundamental concepts of meteorology that are needed to understand onshore, offshore, and airborne wind energy. Topics include: forces affecting winds; terrain and land-use effects; air turbulence; numerical modeling; wind power and energy from turbines; and wind measurement technologies. May be crosslisted with GEOG413. PREREQ: MATH241, MATH242, and MATH243 or GEOG220;PHY201 or PHYS207.

MAST 415 METEOROLOGIC PROCESSES IN AIR POLLUTION 3
An introduction to meteorological processes that affect air pollution, such as diffusion, atmospheric stability, and turbulence, with a focus on the atmospheric boundary layer. May be crosslisted with CIEG415, GEOG415. PREREQ: MATH241 and MATH242; CHEM104, CHEM108 or CHEM112; PHYS201 or PHYS207.

MAST 418 MARINE MICROBIAL ECOLOGY 3
Examines role of microbes in the oceans and their impact on oceanographic processes and biochemical cycles in marine environments. Emphasis is on bacteria and their interactions with other marine organisms. Introduces use of molecular tools to examine uncultivated microbes.

MAST 421 COASTAL FIELD BIOLOGY 3
Hands-on study of estuarine and coastal communities with emphasis on patchiness in time and space. Instruction in field techniques as well as analysis and presentation of data. Experience in scientific writing.

MAST 426 ADVANCED ATMOSPHERIC DYNAMICS 3
Part 2 of Atmospheric Dynamics (GEOG 423/623). Topics include Boussinesq approximation, Vorticity dynamics, Kelvin’s circulation theorem; Vorticity equation; Wave theory; Surface and internal gravity waves; and Geophysical fluid dynamics. Crosslisted with GEOG426. PREREQ: MATH243, MATH302, GEOG423.

MAST 427 MARINE BIOLOGY 3
Ecologically-oriented study of biological oceanography and marine biology. Emphasis on food web dynamics, nutrient cycles, and ecophysiology in the open oceans, benthos, coral reefs and hydrothermal vents. Topics include coastal eutrophication, overfishing, role of marine organisms and the oceans in climate change. PREREQ: BISC207, BISC208, MAST314, MAST482.

MAST 428 OFFSHORE WIND POWER: SCIENCE, ENG & POL 3
Integrates multiple disciplines required to understand, plan, regulate and develop offshore wind resources for large-scale power production. Offshore wind is emerging as a critical technology for large CO2 reductions because the technology is available, proven, and cost-competitive, and the resource near population centers.
RESTRICTIONS: Juniors or Seniors only, with permission from instructor.

MAST 437 GEOLOGICAL OCEANOGRAPHY 3
Focuses on processes that create oceanic and continental margin sedimentary record. Topics include marine particle production and composition, transport, seafloor morphology, stratigraphy and paleoceanography. Students gain broad understanding of concepts in geological oceanography and marine geology.

MAST 439 RENEWABLE ENERGY & CLIMATE: LAW, REGULATION AND ENVIRONMENT 1-3
Introduction to US laws and regulations pertaining to greenhouse gases and the generation, transmission, and integration of renewable energy into the electrical, transportation and building heat systems. Explores judicial opinions but also considers technical and scientific sources.
RESTRICTIONS: Freshman and Sophomores may only register with permission from instructor.

MAST 441 ALGAL ECOLOGICAL PHYSIOLOGY 3
The cellular physiology of marine algae with a focus on the phytoplankton in today’s ocean. Emphasis on a range of issues from photosynthesis, nutrient dynamics, and primary production to community dynamics such as seasonal succession and competition among different marine algae.

MAST 442 ECOLOGY AND EVOLUTION OF CORAL REEFS 3
The ecology of reef building corals and coral reef environments are addressed, with an emphasis on control of species diversity and community dynamics, as well as physiological aspects of reproduction, symbioses, and calcification. The geological development of different reefs through time, reticulate evolution, and current policy issues related to human development and reef management are also introduced.

MAST 443 FIELD STUDIES CORAL REEF ENVIRONMENTS 3
The geology, ecology, evolution of coral reef environments are addressed in a field setting. An integrated approach of classroom instruction and theory will complement hands on observation, sampling, and experimentation in the field. Larger issues of climate change and human pressures will also be examined.

MAST 451 MARINE INVERTEBRATE BIODIVERSITY 3
Overview of marine invertebrate structure and function physiology, development analysis, and ecosystems. Emphasis on competitive, geographically and phylogeny. Appreciation of their biodiversity and significance in marine ecosystems. Special attention to systematics and taxonomy of important groups and local fauna.

MAST 455 GEOPHYSICAL FLUID DYNAMICS 3
Development of the fundamental concepts used in analyzing flows in physical oceanography and meteorology. Fundamentals of vorticity dynamics and geostrophy, inviscid theory of Rossby waves, and Ekman boundary layers.

MAST 457 NUMERICAL WEATHER PREDICTION 3
Introduces students to the basic numerical techniques used in current models to predicting and/or simulating weather. Topics include: conservation equations of the atmosphere (momentum, energy, mass); numerical methods of solution (finite difference schemes, time splitting); boundary and initial conditions; coordinate systems (horizontal, vertical, staggering); parameterization schemes (turbulence, radiation, moist physics); and model application and evaluation. Particular emphasis will be placed on the Weather Research and Forecasting (WRF) model. Students will learn to run the WRF model and use it as a benchmark for testing and applying the techniques learned in class.
Crosslisted with GEOG457. PREREQ: GEOG405, MATH243, MATH302, GEOG423.

MAST 458 PALEOClimATOLOGY 3
Covers the factors that cause natural variations in Earth’s climate on different time scales, focusing on biotic, geologic, and geochemical records. Includes discussion of changing continental configurations, atmospheric greenhouse gas levels, and the Earth-Sun geometry on ocean circulation and climate change.
Crosslisted with GEOG458.

MAST 462 CLIMATE CHANGE: POLICY, EQUITY AND MITIGATION 3
Focuses on climate change equity, international compliance mechanisms, and US initiatives. It is designed for graduate students and advanced undergraduates who seek to gain substantive understanding of climate change policy and the means, impediments and opportunities to reaching resolution of complex international questions. May be crosslisted with POSC462, UAPP465.

MAST 464 MARINE SCIENCE SUMMER INTERNSHIP 1-3
Students design a research project with an advisor and present it to peers, advisors and course instructor.

MAST 466 INDEPENDENT STUDY 1-3

MAST 468 UNDERGRADUATE RESEARCH 1-6

MAST 480 RENEWABLE ENERGY AND CLIMATE: LAW, REGULATION AND ENVIRONMENT 1-3
Introduction to US laws and regulations pertaining to greenhouse gases and the generation, transmission, and integration of renewable energy into the electrical, transportation and building heat systems. Explores judicial opinions but also considers technical and scientific sources.
RESTRICTIONS: Freshman and Sophomores must have permission from instructor.

MAST 484 ELECTRIC VEHICLES AND THE GRID 3
This seminar covers design of electric vehicles and charging infrastructure, existing and needed policies, consumer perspective on electric vehicles, and the use of electric vehicles for grid services, including leveling variable generation. May be crosslisted with ELEG484. PREREQ: Students must have had basic physics or engineering in order to understand relationships among voltage, current, resistance, and power.
MAST 492  **MARINE ENVIRONMENTAL STUDIES**  3
Examines the science behind contemporary issues in coastal and marine systems, with emphasis placed on environmental problem solving. Explore how science is practiced to address regional and global topics of concern, including marine pollution, managing shorelines, sustaining ecosystems, and living with climate change. Practical skills in synthesizing scientific literature, data analysis, and public speaking.

PREREQ: MAST382.

MAST 497  **BIOMINFORMATICS PROGRAMMING FOR BIOLOGISTS**  3
Basic PERL programming for biologists doing bioinformatics research with no experience in computer programming. Teaches PERL syntax enabling editing and trouble-shooting existing PERL programs/modules without writing new programs/scripts. Uses Biowolf parallel computing cluster at DBl. Goal is proficiency with computers from command-line, unix-based, terminal interface.

MAST 498  **ENVIRONMENTAL AND SYSTEMS BIOINFORMATICS**  3
Teaches bioinformatic methods used to link genomic/proteomic sequence features to mechanisms of environmental adaptations or metabolic systems organization. For graduate students and advanced undergraduates applying basic informatic approaches/computational tools to research. Expectation of some programming experience. Computational tools include: PERL, PYTHON, R, and Matlab.

MAST 601  **INTRODUCTION TO OCEANOGRAPHY**  3
Topics include the geology and history of the ocean floor, oceanic sediments, the physics of the marine environment and the oceanic circulation, chemical processes in the ocean, and biological processes and production in the oceans.

RESTRICTIONS: For non-oceano-graphers. Requires graduate status.

MAST 602  **PHYSICAL OCEANOGRAPHY**  3
Geographic and hydrodynamic aspects of oceanography. The geography of ocean basins; physical properties of seawater; radiation; and observed distributions of temperature, salinity, oxygen and currents. Scalar and vector fields; hydrostatics; kinematics, momentum dynamics, vorticity dynamics, viscous flow and eddy flux.

RESTRICTIONS: Requires permission of instructor.

MAST 604  **ENVIRONMENTAL DATA MANAGEMENT**  1
Emphasizes the use of remotely sensed data for research and management of coastal resources. Environmental issues and data requirements are discussed. Case studies illustrate the use of Geographic Information Systems for integrating remotely sensed imagery with ancillary data to address coastal environmental problems.

RESTRICTIONS: Requires approval of instructor.

MAST 606  **OCEAN AND ATMOSPHERE REMOTE SENSING**  3
Fundamentals of ocean and atmosphere remote sensing including space platforms, their orbits, instruments, data retrieval and image processing methods. Oceanographic and atmospheric applications of remote sensing and new developments in sensors and data analyses. May be crosslisted with CIEG606, ELEEG606, GEOG606.

MAST 607  **WRITING PAPERS IN THE MARINE SCIENCES**  3
The process and mechanics of publishing scientific papers in scientific journals. Covers organizing data in tables and figures; mechanics of drawing up effective figures; marshalling of tables, figures and scientific ideas into a coherent story; and strategies and techniques used in effective writing. Examples taken from and principles applicable to all fields of science.

MAST 608  **HEAT AND LIGHT IN NATURE - RADIATIVE TRANSFER**  3
The energetic interaction of sunlight with the atmosphere and oceans influences the entire earth system. Examines the theory of radiative transfer within the ocean and atmosphere, and then explores several areas of applicable research including climate modeling and remote sensing.

May be crosslisted with GEOG608.

MAST 609  **THE OCEAN & CLIMATE VARIATION**  3
Study of the ocean-atmosphere system; the fluxes of heat, water and energy in the ocean and interchanges with the atmosphere; budgets and mechanisms of exchange; and interannual and long-term climate variations as related to the ocean.

May be crosslisted with GEOG609.

MAST 613  **METEOROLOGICAL PROCESSES FOR WIND ENERGY**  3
This course explores the fundamental concepts of meteorology that are needed to understand onshore, offshore, and airborne wind energy. Topics include: forces affecting winds; terrain and land-use effects; air turbulence; numerical modeling; wind power and energy from turbines; and wind measurement technologies.

May be crosslisted with GEOG613.

MAST 615  **METEOROLOGIC PROCESSES IN AIR POLLUTION**  3
An introduction to meteorological processes that affect air pollution, such as diffusion, atmospheric stability, and turbulence, with a focus on the atmospheric boundary layer. May be crosslisted with CIEG615, GEOG615. PREREQ: MATH 241 and MATH 242; CHEM104 or CHEM108 or CHEM112; PHYS201 or PHYS207.

MAST 616  **METHODS IN MOLECULAR BIOLOGY**  3
Conceptual experience in molecular biological techniques with an emphasis on their application to marine related problems. Topics include: nucleic acid extractions, cloning, gene amplification and characterization, and expression methodologies.

PREREQ: MAST634

MAST 617  **METHODS IN MOLECULAR BIOLOGY LABORATORY**  3
Provides practical experience in molecular biological techniques with emphasis on applications to marine related problems.

COREQ: MAST616

MAST 618  **MARINE MICROBIAL ECOLOGY**  3
Examines role of microbes in the oceans and their impact on oceanographic processes and biogeochemical cycles in marine environments. Emphasis is on bacteria and their interactions with other marine organisms. Introduces use of molecular tools to examine uncultivated microbes.

RESTRICTIONS: Requires permission of instructor.

MAST 620  **ENERGY POLICY AND ADMINISTRATION**  3
Analyzes energy use and energy policy with respect to politics, society, economics, political economy, technology, resources, and environment. Focuses on interrelationships among energy, environment, economy and equity (EA). It considers the energy policy options needed to achieve a more sustainable world. Crosslisted with ENEP625.

MAST 621  **COASTAL FIELD BIOLOGY**  3
Hands-on study of estuarine and coastal communities with emphasis on patchiness in time and space. Instruction in field techniques as well as analysis and presentation of data. Experience in scientific writing.

MAST 622  **CONSERVATION AND RENEWABLE ENERGY POLICY**  3
Covers current policy issues for energy conservation, energy efficiency, and renewable energy sources. Some prior background in energy policy is assumed. Topics include environmental impacts, utility programs, and international comparisons.

MAST 623  **PHYSIOLOGY OF MARINE ORGANISMS**  3
Processes and mechanisms of adaptation of organisms to marine environments. Examines how environmental factors affect physiological processes in marine organisms. Lectures address physiological processes at cellular, whole organism and habitat levels.

PREREQ: Graduate Students only or permission from instructor.

MAST 625  **MICROBIAL PHYSIOLOGY AND DIVERSITY**  3
Emphasis on diversity of physiological strategies developed by prokaryotic microbes and some simple eukaryotes. Approach is to examine and dissect specific metabolic pathways both in isolation and in how they integrate with central metabolism.

PREREQ: BISC 207/208, CHEM 321 or CHEM 331, or permission of instructor

RESTRICTIONS: Juniors, Seniors, and Graduate Students

MAST 627  **BIOLOGICAL OCEANOGRAPHY**  3
Eco-geographically oriented study of biological oceanography and marine biology. Emphasis on food web dynamics, nutrient cycles, and ecophysiology in the open oceans, benthos, coral reefs and hydrothermal vents. Special topics include coastal eutrophication, overfishing, role of marineorganisms and the oceans in climate change. Students will be expected to read primary literature, write a research proposal and learn some basic programming to solve homework problems.

PREREQ: Undergraduates must have BISC207, BISC208, MAST314, MAST482. No prerequisites for graduate students.

MAST 628  **OFFSHORE WIND POWER: SCIENCE, ENGINEERING AND POLICY1-4**  3
Covers multiple disciplines required to develop offshore wind resources for large-scale power production. As a case study, it integrates science, engineering, and policy.

RESTRICTIONS: Open to graduate students only.
MAST 630  Ichthyology  3
The biology of fishes with emphasis on marine fishes and their adaptations and roles in the marine environment. The first half of the course covers the diversity of fishes (characteristics, classification, & zoogeography). This part establishes a foundation in the diversity of fishes, family-level characteristics, and overall relationships among fish groups. The second half covers fish anatomy, physiology, and behavior, and the ecology of fishes and fish communities. Although the course focuses on marine fishes, many of the topics covered apply to fishes in all environments.

MAST 634  Marine Molecular Sciences  3
This course surveys the dominant molecular processes in marine organisms that are essential for survival. Students are introduced to metabolic pathways, protein structure and function, DNA replication and repair, gene transcription and translation, and mitochondrial and chloroplast organelle function.

MAST 635  Turbulence in the Environment  3
Fundamentals of turbulence including the dynamics of vorticity, the cascade of energy and the theory of Kolmogorov, turbulent diffusion and turbulence in density stratified flows. Applications to many engineering disciplines as well as to meteorology and oceanography.

MAST 637  Geological Oceanography  3
Focuses on processes that create the oceanic and continental margin sedimentary record. Topics include marine particle production and composition, transport, seafloor morphology, stratigraphy and paleoceanography. Students gain a broad understanding of concepts in geological oceanography and marine geology.

MAST 639  Renewable Energy and Climate: Law, Regulation and Environment  1-3
Introduction to US laws and regulations pertaining to greenhouse gases and the generation, transmission, and integration of renewable energy into the electrical, transportation and building heat systems. Explores judicial opinions but also considers technical and scientific sources. May be crosslisted with UAPP739.

MAST 641  Algal Ecological Physiology  3
The cellular physiology of marine algae with a focus on the phytoplankton in today's ocean. Emphasis on a range of issues from photosynthesis, nutrient dynamics, and primary production to community dynamics such as seasonal succession and competition among different marine algae.

MAST 642  Ecology and Evolution of Coral Reefs  3
The ecology of reef building corals and coral reef environments are addressed, with an emphasis on control of species diversity and community dynamics, as well as physiological aspects of reproduction, symbioses, and calcification. The ecological development of different reefs through time, reticulate evolution, and current policy issues related to human development and reef management are also introduced.

MAST 646  Chemical Oceanography  3
Composition of seawater; physiochemical properties of seawater distributions of gases, nutrients and trace metals; and effect of biological processes on seawater composition. PREREQ: CHEM103 and CHEM204, or CHEM107 and CHEM108.

MAST 648  Water Wave Mechanics  3
Primary emphasis on linear water wave theory and its applications. Shoaling, refraction and diffraction of waves. Basic aspects of wave-structure and wave-bottom interaction. Introduction to basic wave propagation models. Crosslisted with CIEG672. PREREQ: CIEG305.

MAST 651  Marine Invertebrate Biodiversity  3
Overview of marine invertebrate structure and function, physiology, development and life history, and ecology within the context of their evolutionary origins and phylogeny. Appreciation of their biodiversity and significance in marine ecosystems. Special attention to systematics and taxonomy of important groups and local fauna.

MAST 654  Applications in Environmental Economics  3
Nonmarket valuation and other empirical methods used in the application of the theory of environmental economics to policy issues pertaining to water and air quality, climate change, and other relative environmental resources. May be crosslisted with ECON654.

MAST 655  Geophysical Fluid Dynamics  3
Development of the fundamental fluid dynamics used in analyzing flows in physical oceanography and meteorology. Fundamentals of vorticity dynamics and geostrophy, inviscid theory of Rossby waves, and Ekman boundary layers.

MAST 658  Paleoclimatology  3
Covers the factors that cause natural variations in Earth's climate on different time scales, focusing on biotic, geologic, and geochronological records. Includes discussion of changing continental configurations, atmospheric greenhouse gas levels, and the Earth-Sun geometry on ocean circulation and climate change. Crosslisted with GEOG658.

MAST 659  Regional Climate Modeling: Tech & Appl  3
Global change is impacting an increasing number of sectors in science, engineering and policy, creating a need for high-resolution regional climate data used in impact assessments and mitigation plans. The primary objective is to understand regional climate processes, modeling techniques, and tools for analysis. Crosslisted with GEOG659. PREREQ: MATH201 or STAT475 or STAT200.

MAST 660  International and National Ocean Policies  3
Analyzes the major policy and legal frameworks for managing oceans and coasts at international, regional, and national levels, with special attention to the Law of the Sea Convention, to the world summits on sustainable development, and to United States ocean policy.

MAST 661  Introduction to Ocean Modeling  3
Introduction to numerical methods used to solve the equations of ocean motion. Topics range from basic numerical concepts with applications to general transport and shallow-water equations to an overview of turbulence and ocean circulation models that are employed to understand weather and climate. May be crosslisted with CIEG661, GEOG661. PREREQ: CIEG639, or permission from instructor.

MAST 662  Climate Change: Policy, Equity and Mitigation  3
Focuses on climate change equity, international compliance mechanisms, and US initiatives. It is designed for graduate students and advanced undergraduates who seek to gain substantive understanding of climate change policy and the means, impediments and opportunities to reaching resolution of complex international questions. May be crosslisted with UAPP665.

MAST 663  Decision Tools for Policy Analysis  3
Develops quantitative decision-making skills for science and technology policy decisions. Covers decision-making under uncertainty, axioms of decision analysis, decision trees, influence diagrams, sensitivity analysis, confidence intervals, value of information, probabilistic risk assessment, and multi-attribute decision theory. May be crosslisted with UAPP663.

MAST 669  Statistics For The Marine Sciences  3
Introduces the fundamental practices of statistics, emphasizing methods used in marine sciences. Topics include exploratory data analysis, correlation, regression, analysis of variance, analysis of frequencies, statistical graphics, basic experimental design and modern computer-intensive statistical methods. Weekly computer lab included to conduct statistical analyses.

MAST 671  Coastal Processes and Management  3
Introduction to key processes operating in the coastal zone and to management techniques appropriate to these processes and environments. Emphasis on policy, regulatory and intergovernmental complexities that characterize coastal zone management in the United States and in other coastal nations.

MAST 672  Benefit-Cost Analysis  3
Empirical analysis of environmental and natural resource policy issues. Topics include valuation of natural resources, decision making under uncertainty, dynamic control and intertemporal issues in resource use and institutional aspects of policy analysis. May be crosslisted with ECON670. PREREQ: ECON300 or ECON301.

MAST 673  International Law  3
Origins, sources and applications of law to international relations, including the nature of treaties, the legal powers of states and international organizations, jurisdiction and immunities, and the role of international courts. Special attention given to the law of the sea for navigation, fisheries conservation, mineral exploitation and environmental protection. May be crosslisted with LEST673. RESTRICTIONS: Requires permission of instructor.
MAST 674 LEGAL ASPECTS OF THE COASTAL ZONE
Examines basic legal doctrines and public policy implications relevant to the development and protection of the coastal zone of the United States. Use, ownership and control of water and land beneath and bordering upon water; relationships between the states and the federal government in areas of maritime affairs; environmental protection and legal controls of water pollution.
RESTRICTIONS: Requires permission of instructor.

MAST 675 ECONOMICS OF NATURAL RESOURCES
Study of the allocation of natural resources, especially marine and coastal zone resources, in modern economics. Application of economic theory to the problems of misallocations and the means of correction, under both free and planned markets.
May be crosslisted with ECON675.

MAST 676 ENVIRONMENTAL ECONOMICS
Study of the choice of policies to protect the environment, including land, air and water resources. Theory of market failure and externalities, use of economic incentives in policy design, valuation of environmental resources and examination of inefficiencies in existing U.S. environmental policies.
May be crosslisted with ECON676.

MAST 681 REMOTE SENSING OF ENVIRONMENT
Detection and mapping of land and ocean resources with optical, infrared and microwave sensors. Digital analysis of satellite images using multispectral and spatial analysis techniques and correlation with ground/ship data. Application to oceanography, coastal processes, geology, land use, geography, agriculture, climate and pollution studies. Includes hands-on image analysis in GIS laboratory.
May be crosslisted with CHEM683.

MAST 683 ENVIRONMENTAL CHEMISTRY
Reactions in gas, liquid and solid phases of the Earth's atmosphere, hydrosphere, and geosphere, and energy fluxes and chemical exchanges across these interfaces discussed in the context of basic chemical principles. Applications to current issues such as climate change and air/water pollution discussed.
Crosslisted with CHEM683.

MAST 684 ELECTRIC VEHICLES AND THE GRID
This seminar covers design of electric vehicles and charging infrastructure, existing and needed policies, consumer perspective on electric vehicles, and the use of electric vehicles for grid services, including leveling variable generation.
May be crosslisted with ELEG684. PREREQ: Enough physics or engineering to understand relationships among voltage, current, resistance and power.

MAST 685 FUNDAMENTALS OF ACOUSTICS
Fundamentals of sound and vibration, including equations governing vibrating string, vibration of bars, two-dimensional wave equation in plates, acoustic wave equation, transmission phenomena and acoustic radiation and reception. Other topics include absorption and attenuation of sound, resonators and ducts and filters, in the context of environmental and underwater acoustics.
PREREQ: Calculus and introduction to differential equations

MAST 686 REMOTE SENSING SEMINAR 1-12
Basic and applied research topics in remote sensing of earth resources, coastal processes, estuarine productivity, ocean dynamics and climatic effects presented by University students, faculty and guest speakers. Stresses advanced data acquisition and spectral and spatial image analysis techniques.
RESTRICTIONS: May be repeated for credit when topics vary.

MAST 691 FLUID DYNAMICS IN MARINE SYSTEMS
The material covered includes kinematics and dynamics of fluids with emphasis on coastal and ocean flows; governing equations; viscous flows; flows on a rotating planet; flows with variable density; boundary layers; transport, diffusion and mixing in the oceans and coastal zones; simple models; and turbulence.

MAST 692 ENVIRONMENTAL VALUES, MOVEMENTS AND POLICY
Examines citizens' beliefs and values, voluntary environmental groups and the ways in which individuals and groups affect environmental policy. Shows how research in areas such as environmental sociology and ecological anthropology can inform policy.
May be crosslisted with UAPP692.

MAST 693 WAVES IN THE MARINE ENVIRONMENT
General principles of wave mechanics, kinematics and dynamics. Applications to surface gravity waves, acoustic waves, electromagnetic waves and large scale geophysical waves.
May be crosslisted with CIEG693. PREREQ: MEEG690

MAST 694 SYSTEMS BIOLOGY I
Couples lectures and hands-on exercises to introduce students to experimental methods and bioinformatics analysis in systems biology, showing how global analysis of omics data improves understanding of biological systems. Covers three units: (i) experimental techniques; (ii) genomics and transcriptomics data analysis; and (iii) proteomics and pathway/network data analysis.

MAST 697 BIOINFORMATICS PROGRAMMING FOR BIOLOGISTS
Basic PERL programming for biologists doing bioinformatics research with no experience in computer programming. Teaches PERL syntax enabling editing and trouble-shooting existing PERL programs/modules without writing new programs/scripts. Uses Biowolf parallel computing cluster at DBL. Goal is proficiency with computers from command-line, unix-based, terminal interface.

MAST 698 ENVIRONMENTAL AND SYSTEMS BIOINFORMATICS
Teaches bioinformatic methods used to link genomic/proteomic sequence features to mechanisms of environmental adaptations or metabolic systems organization. For graduate students and advanced undergraduates applying basic bioinformatic approaches/computational tools to research. Expectation of some programming experience. Computational tools include: PERL, PYTHON, R, and Matlab.

MAST 801 ENVIRONMENTAL MEASUREMENT TOOLS 1-5
Provides exposure to limitations of techniques used in sampling and analyses that develop information used in resource management decision making. The 5-credit team-taught course has separate components. Students in the Marine Management degree program would take all 5 credits.
RESTRICTIONS: Winter Session offering for MA program in the College of Marine Studies. Students outside the program may take portions of the full course as 1 or 2 credit components.

MAST 802 CASE STUDY IN ENVIRONMENTAL DECISION MAKING
Analyzes issues in environmental management of coupled-human-natural systems such as coastal regions. Develops interdisciplinary problem-solving strategies. Engages students in real-world marine science/policy problems. Applies disciplinary knowledge, develops synthesis skills. Topics change, but case designs contain multi-disciplinary elements, e.g., physical ocean science, marine biology, oceanography, and marine policy.

MAST 808 COASTAL/ESTUARINE PHYSICAL DYNAMICS 4
Coastal and estuarine dynamics covering continental shelf wind-forced circulation; continental shelf waves; modes of estuarine circulation; shelf-estuary interaction; shelf front break dynamics; and estuarine and river plume fronts.
PREREQ: MAST602.

MAST 811 OCEANOGRAPHIC TIME SERIES ANALYSIS
Quantitative techniques for data processing and time series analysis. Topics include basic definitions, linear systems, digital filters, statistical techniques, auto-spectrum estimation, cross-spectrum estimation, Monte Carlo technique, empirical orthogonal function analysis and rotary spectrum estimation.
RESTRICTIONS: Requires permission of instructor.

MAST 812 ETHICS, BUSINESS AND COMMUNICATION
Provides professional development in ethics, business and communication related to systems biology research applications in stem cell, tissue engineering, and drug delivery technologies. Intended for PhD students in interdisciplinary life science and engineering programs.
Crosslisted with BINF815.

MAST 813 SYSTEMS BIOLOGY OF CELLS IN ENGINEERED ENVIRONMENTS
Provides a technical review of systems biology approaches including genomics, transcriptomics, proteomics, metabolomics, and bioinformatics as well as applications in tissue engineering, stem cell differentiation, and drug delivery. Intended for PhD students in interdisciplinary life science and engineering programs.
Crosslisted with BINF816.

MAST 814 POLITICAL ECONOMY OF THE ENVIRONMENT
Reviews major theories developed over the last half century to explain nature-society relations. Policy case studies on economic and social justice, trade and environment, global climate change, and sustainable development used to evaluate current range of political-economic explanations of nature-society relations. International, national and local responses to these problems are analyzed.
Crosslisted with ENEP810.

MAST 817 RESEARCH DESIGN AND METHODS 3
Covers the logic, design and practice of public policy research, and should be helpful for planning thesis or dissertation research, regardless of topic or methods used. Methods covered draw from social and political sciences, and process evaluation of policy.
MAST 820 DATA ANALYSIS AND STATISTICAL MODELING 1-3
Overview of advanced, multivariate data analysis and statistical modeling of large research datasets in marine science. Students will analyze their own data and present findings related to workflow, programming and computation, statistical theory, and effective presentation of data-based conclusions. Work.
PREREQ: Basic, one-semester, univariate statistics class.

MAST 821 MARINE BIOLOGY/BIOCHEMISTRY SEMINAR 1
With each offering, addresses a different specific topic, e.g., tropical marine biology, larval dispersal, estuarine productivity, etc.
RESTRICTIONS: May be repeated for credit when topics vary.

MAST 827 CURRENT TOPICS IN MARINE BIOLOGY 1-4
Subject areas change each term. Topics include aspects of plant biology, fish and invertebrate ecology and other aspects of marine ecology. May include lectures, tutorials and demonstration of techniques. See http://primus.nss.udel.edu/CoursesSearch/ for topics.
RESTRICTIONS: Requires permission of instructor. May be repeated for credit when topics vary.

MAST 831 COASTAL AND ESTUARINE SEDIMENTOLOGY 3
Fundamentals of sediments and sedimentary processes in modern coastal and estuarine environments. Basics of fluid flow and sediment transport are covered along with advanced topics in strata formation and morphodynamics.

MAST 833 MESOSCOPIC CFD METHOD 3
Crosslisted with MEEG833.

MAST 847 CURRENT TOPICS IN CHEMICAL METHODS IN OCEANOGRAPHY 1-3
Principles, capabilities and limitations of analytical methods to the chemistry of marine waters and sediments. Analytical methods include electrochemical, spectrophotometric, chromatographic, electron microscopy and surface techniques. Emphasis on the analysis of trace components (biochemical, inorganic and organic) in the marine environment. Laboratory experiments. See http://primus.nss.udel.edu/CoursesSearch/ for topics.
PREREQ: MAST646 or analytical chemistry. RESTRICTIONS: May be repeated for credit when topics vary.

MAST 850 MARINE INORGANIC CHEMISTRY 3
Principles of inorganic chemistry are used to explain and to understand the speciation and reactivity of the elements in the marine environment. Emphasis on the mechanistic aspects of important marine processes including mineral dissolution and formation, electron transfer reactions and the role of metals in biogeochemical reactions. May be crosslisted with CHEM855. PREREQ: MAST646, aquatic chemistry or physical chemistry.

MAST 852 ISOPOE GEOCHEMISTRY 3
Introduction to the field of isotope geochemistry and the application of isotopic systematics to the study of geological, geochemical, hydrological, atmospheric and marine cycles. Light stable isotopes, uranium thorium decay series nuclides, and long-lived heavy isotopes are considered. May be crosslisted with GEOLOGY.

MAST 853 OCEANOGRAPHY SEMINAR 1-12
A review of current oceanographic literature through student presentations.
RESTRICTIONS: May be repeated for credit when topics vary.

MAST 855 COASTAL AND ESTUARINE CHEMISTRY 3
Distributions, behavior, and chemical processes in estuarine and coastal waters are examined in this advanced general chemical oceanography course. Greater heterogeneity of physical controls and anthropogenic influences give a unique nature to this coastal corridor in the global flux from land to sea.
PREREQ: MAST646

MAST 857 PALEOCEANOGRAPHY 3
Focuses on processes related to climate change from tectonic to millennial timescales based on the marine sedimentary record of the past 65 million years. Topics include light stable isotopes and biogeochemical cycling of elements. Includes lectures and student-lead discussion of current literature.
May be crosslisted with GEOLOGY. RESTRICTIONS: Requires permission of instructor.
MATH 114 COLLEGE MATHEMATICS AND STATISTICS 3
Stresses mathematical concepts and algebraic skills with a strong emphasis on applications in the areas of management, life and social sciences. Topics include various function classes and models, linear programming and statistics including descriptive and inferential statistics. PREREQ: MATH010. Students must achieve an acceptable score on the Math Placement Exam in accordance with current standards determined by the Department of Mathematical Sciences. See www.math.udel.edu/placement for more information. RESTRICTIONS: Only four credits from any combination of MATH113, MATH114, MATH115, MATH117, MATH127, MATH170 and MATH171 can count toward graduation.

MATH 115 PRE-CALCULUS 3
The various classes of functions and their graphs are explored. Function classes include linear, quadratic, polynomial, rational, exponential, logarithmic and trigonometric. Skills and concepts needed for calculus (MATH211) are emphasized. PREREQ: MATH100. Students must achieve an acceptable score on the Math Placement Exam in accordance with current standards determined by the Department of Mathematical Sciences. See www.math.udel.edu/placement for more information. RESTRICTIONS: Only four credits from any combination of MATH113, MATH114, MATH115, MATH117, MATH127, MATH170 and MATH171 can count toward graduation.

MATH 117 PRE-CALCULUS FOR SCIENTISTS AND ENGINEERS 4
Designed to prepare students for MATH241. All topics included in MATH115 are covered, as well as additional topics in functions, trigonometry, linear systems, and nonlinear systems. Other topics may be added at the discretion of the instructor. PREREQ: Students must achieve an acceptable score on the Math Placement Exam in accordance with current standards determined by the Department of Mathematical Sciences. See www.math.udel.edu/placement for more information. RESTRICTIONS: Only four credits from any combination of MATH113, MATH114, MATH115, MATH117, MATH127, MATH170 and MATH171 can count toward graduation.

MATH 127 MATHEMATICS AND QUANTITATIVE REASONING 3
Mathematics driven by typical quantitative reasoning needed in everyday life. Combines critical thinking with basic mathematics in contexts encountered in various areas such as finance, social sciences, politics, the environment, etc. Includes probability and statistics, basic logic, and basic finance. PREREQ: High school algebra RESTRICTIONS: Only four credits from any combination of MATH113, MATH114, MATH115, MATH117, MATH127, MATH170 and MATH171 can count toward graduation.

MATH 201 INTRODUCTION TO STATISTICAL METHODS I 3
Exploratory data analysis, basic probability, discrete and continuous distributions, sampling distributions and confidence intervals, and one- and two-sample hypothesis tests on means and proportions. Emphasis on applications in business and economics. Statistical computing is an integral part of this course. PREREQ: College algebra. RESTRICTIONS: Credit may be awarded for only one of STAT200, APEC408, MATH201, and MATH205.

MATH 202 INTRODUCTION TO STATISTICAL METHODS II 3
Two-sample tests on means and proportions, chi-square analysis of contingency tables, completely randomized and randomized block designs, factorial experiments, analysis of variance, simple linear and multiple regression, model diagnostics, quality control, time series analysis. Emphasis on applications in business and economics. Statistical computing is an integral part of this course. PREREQ: MATH201.

MATH 205 STATISTICAL METHODS 4
Descriptive statistics, graphical displays, sampling, variation, normal distribution, estimation, hypothesis testing, one-way analysis of variance, simple linear regression and goodness of fit. Laboratory covers use of statistical packages on mainframe and microcomputers. PREREQ: MATH210 or MATH230. RESTRICTIONS: Credit may be awarded for only one of STAT200, APEC408, MATH201, and MATH205.

MATH 210 DISCRETE MATHEMATICS I 3
Sets, logic, induction, number systems, counting, introduction to graph theory, sequences and formal power series. COREQ: MATH221 or MATH241 or MATH242

MATH 217 ALGEBRA FOR MIDDLE SCHOOL TEACHERS 3
Examines algebraic concepts developed in the middle grades, including linearity; meanings and uses of variables; and the representation of situations using functions, graphs, and equations. RESTRICTIONS: Credit is not given for mathematics majors or minors.

MATH 221 CALCULUS I 3
Topics include functions, graphing functions, limits, derivatives, exponential and logarithmic functions, integration, and techniques of integration. Business applications are emphasized. PREREQ: Requires two years of high school algebra, one year of geometry, and one year of precalculus, or MATH115, or students must achieve an acceptable score on the Math Placement Exam in accordance with current standards determined by the Department of Mathematical Sciences. See www.math.udel.edu/placement for more information. RESTRICTIONS: Credit cannot be received for both MATH221 and MATH241.

MATH 222 CALCULUS II 3
Topics include integration, Taylor polynomials, series, multivariable calculus and trigonometric functions. PREREQ: MATH221 or Math241. RESTRICTIONS: For students in the behavioral, management and social sciences. Credit cannot be received for both MATH222 and MATH242.

MATH 230 FINITE MATHEMATICS WITH APPLICATIONS 3
Set theory, probability, optimization, linear programming and an introduction to matrix methods. PREREQ: MATH221 RESTRICTIONS: For students in the behavioral, management and social sciences.

MATH 240 GEOMETRY AND MEASUREMENT FOR MIDDLE SCHOOL TEACHERS 3
Explores geometry and measurement topics and how they are developed throughout the middle school curriculum. Topics include properties of 2D and 3D figures, coordinate geometry, transformations, measurement of length, area and volume, and fundamentals of a deductive system. Includes the use of technology. RESTRICTIONS: Open only to students pursuing middle school mathematics teaching certification. Grade of C- or higher in MATH253 or permission of instructor.

MATH 241 ANALYTIC GEOMETRY AND CALCULUS A 4
Functions, limits, continuity, derivatives and definite integrals. Exponential and log functions; simple differential equations modeling exponential growth and decay (linear and separable ODEs). PREREQ: MATH 117, or students must achieve an acceptable score on the Math Placement Exam in accordance with current standards determined by the Department of Mathematical Sciences. See www.math.udel.edu/placement for more information. RESTRICTIONS: Credit cannot be received for both MATH241 and MATH242.

MATH 242 ANALYTIC GEOMETRY AND CALCULUS B 4
Review of exponential and logarithmic functions; inverse trigonometric functions; integration techniques; parametric curves; polar coordinates; infinite series. Includes use of the computers to perform symbolic, numerical and graphical analysis. PREREQ: MATH241. RESTRICTIONS: Credit cannot be received for both MATH242 and MATH222.

MATH 243 ANALYTIC GEOMETRY AND CALCULUS C 4
Vectors, operations on vectors, velocity and acceleration, partial derivatives, directional derivatives, optimization of functions of two or more variables, integration over two and three dimensional regions, line integrals, Green’s Theorem. Includes use of computers to perform symbolic, numerical and graphical analysis. PREREQ: MATH242.

MATH 245 AN INTRODUCTION TO PROOF 3
Basic set operations, relations, equivalence relations, functions, inverse functions, cardinality, order properties of real numbers, least upper bound, greatest lower bound, completeness axiom, topology of reals, complex numbers. PREREQ: MATH210 and MATH242.

MATH 251 MATHEMATICS FOR K-8 TEACHERS: NUMBER AND OPERATIONS 3
Explores concept development in numeration systems, base ten system, the meaning of the four operations, number theory, and integers. Emphasis on problem solving and general number sense. RESTRICTIONS: Successfully pass the School of Education Competency Test.

MATH 252 MATHEMATICS FOR K-8 TEACHERS: RATIONAL NUMBERS AND PROBABILITY 3
Explores concept development in rational numbers, operations with rational numbers, proportional reasoning, and probability. PREREQ: MATH251 RESTRICTIONS: Grade of C- or higher in MATH251.

MATH 253 MATHEMATICS FOR K-8 TEACHERS: GEOMETRY, ALGEBRA AND MEASUREMENT 3
Explores concept development in figures, the role of definitions, coordinate geometry, transformations, functions and measurements of length, area and volume. PREREQ: MATH252 RESTRICTIONS: Grade of C- or higher in MATH252.
MATH 260  INTEGRATIVE SEMINAR  1
Problem-based learning instruction aimed at integrating material in mathematics and biology.
RESTRICTIONS: Primarily for students in biological sciences and mathematics. Requires permission of instructor.

MATH 268  PERSPECTIVES ON MATHEMATICS  1
Introduction to University of Delaware rules and regulations, resources, and educational enrichment opportunities. Discussion of University and departmental expectations, academic conduct, and important academic advisement issues. Perspectives on mathematics, its applications, and careers for math majors. The role of mathematics in society at large.
RESTRICTIONS: Majors only.

MATH 279  PROBLEM SOLVING STRATEGIES I  1
Designed to study a multitude of problem solving strategies such as working backwards, looking for a pattern, etc. Emphasizes the use of these strategies with the content that secondary mathematics teachers normally teach.
COREQ: MATH241.

MATH 302  ORDINARY DIFFERENTIAL EQUATIONS  3
Solutions and applications of ordinary differential equations as well as systems. Considers initial value problems and boundary value problems. Topics include Laplace transform, the phase plane, series solutions and partial differential equations. Includes use of computers to solve differential equations.
COREQ: MATH343. RESTRICTIONS: Credit not given for both MATH302 and either MATH341, MATH342, MATH351 or MATH352.

MATH 305  APPLIED MATHEMATICS FOR BIOMED, CHEM AND BIOMOL  3
A special applied mathematics course designed for chemical engineering majors. Emphasis is given on the interaction between mathematical theory and its engineering applications.
May be crosslisted with CHEG305. PREREQ: A minimum grade of C- in MATH242 and CISC106. RESTRICTIONS: For chemical engineering and biomedical engineering majors only. Credits cannot be received for both MATH302 and MATH305.

MATH 308  HISTORICAL DEVELOPMENT OF MATHEMATICAL CONCEPTS AND IDEAS  3
Illustrates the origins of ideas, processes and topics in the history of mathematics. Biographical sketches of the creators, descriptions of their diverse cultures and a writing project are included.
PREREQ: MATH241. RESTRICTIONS: Credits cannot be used to satisfy major or minor requirements in mathematics other than the secondary mathematics education program.

MATH 315  DISCRETE MATHEMATICS II  3
Algorithmic graph theory and computational geometry. Topics in graph theory cover shortest path problems, coloring problems, and others. The computational geometry covers Steiner tree, convex hull, design of experiments and selected topics.
PREREQ: MATH210.

MATH 341  DIFFERENTIAL EQUATIONS WITH LINEAR ALGEBRA I  3
Topics include first and second order differential equations, systems of algebraic equations, determinants, vector spaces, eigenvalues and eigenvectors of matrices and systems of differential equations. Emphasis on the interaction between these topics and appropriate physical systems.
PREREQ: MATH242 RESTRICTIONS: Credit not given for both MATH341 and either MATH302, MATH349 or MATH351. Open to majors outside mathematics.

MATH 342  DIFFERENTIAL EQUATIONS WITH LINEAR ALGEBRA II  3
A continuation of MATH351. Topics include nonlinear systems, Fourier Series, Laplace transform methods, linear transformations, inner product spaces, orthogonality, and use of numerical software. Continued emphasis on the interaction between these topics and physical systems.
PREREQ: MATH351. RESTRICTIONS: Students receiving credit for MATH342 cannot receive credit for MATH302 or MATH349.

MATH 349  ELEMENTARY LINEAR ALGEBRA  3
PREREQ: MATH230 or MATH242 RESTRICTIONS: Credit not given for both MATH349 and either MATH341, MATH342 or MATH351.

MATH 350  PROBABILITY THEORY AND SIMULATION METHODS  3
Introduces the basic theory of discrete and continuous aspects of probability theory. Topics include bivariate distributions, sums of independent random variables, moment generating functions, laws of large numbers and central limit theorem.
COREQ: MATH243. RESTRICTIONS: Requires basic knowledge of the counting principles in permutation and combination.

MATH 351  ENGINEERING MATHEMATICS I  3
Solutions of linear algebraic equations, Gauss elimination, vector spaces, subspaces, linear dependence, linear ordinary differential equations of 2nd order and higher, initial value problems, eigenvalues, coupled linear ordinary differential equations, nonlinear differential equations, with engineering applications.
COREQ: MATH243. RESTRICTIONS: Students receiving credit for MATH351 cannot receive credit for MATH302 or MATH349.

MATH 352  ENGINEERING MATHEMATICS II  3
Laplace transform, application to constant coefficient ordinary differential equations, scalar and vector fields, Laplacian, line integrals, divergence theorem, Stokes' theorem, Fourier series, orthogonality, diffusion equation, Laplace's equation, wave equation, separation of variables, with engineering applications.
PREREQ: MATH351. RESTRICTIONS: Open to MEEG and CIEG majors only.

MATH 353  ENGINEERING MATHEMATICS III  3
PREREQ: MATH351 and CISC106. RESTRICTIONS: Open to MEEG and CIEG majors.

MATH 366  INDEPENDENT STUDY  1-6

MATH 379  PROBLEM SOLVING STRATEGIES  1
Studies a multitude of problem solving strategies such as looking for a pattern, making a model, working backwards, etc.
COREQ: MATH380 RESTRICTIONS: Requires permission of the Committee on Secondary School Mathematics. Not for major (B.A. or B.S.) or minor credit in mathematical sciences.

MATH 380  APPROACHES TO TEACHING MATH  3
Aims, course planning, instructional strategies, evaluation and selection of materials for teaching mathematics in secondary schools.
PREREQ: Passing scores on all sections of the Praxis I exam. COREQ: MATH379. RESTRICTIONS: Requires permission of the Committee on Secondary School Mathematics. Not for major (B.A. or B.S.) or minor credit in mathematical sciences.

MATH 382  STUDENT TEACHING SEMINAR IN SECONDARY MATH  2 PF
Provides student teachers opportunities to reflect upon and discuss classroom teaching experience. Focuses on classroom management and other professional issues.
PREREQ: MATH380 COREQ: EDUC400.

MATH 383  TEACHING AND LEARNING SECONDARY MATHEMATICS I  3
Emphasis on standards for school mathematics, cognitively demanding tasks, and developing lesson plans, unit plans, and long-term plans. Focuses on problem solving as an effective instructional strategy for teaching mathematics in secondary schools. Addresses the importance of affect and motivation in the learning of mathematics. Examines the teaching and learning of Number and Operations, Measurement, Algebra, Functions, Trigonometry, and Modeling and incorporates content specific use of technology. Includes a teaching/field experience.
PREREQ: Must have completed 18 credits in Math courses at the 200 level or higher one of which must be MATH243. RESTRICTIONS: Students must have completed 60 credits of course work. Requires permission of the Committee on Secondary School Mathematics. This course cannot count towards the Minor in Math or any other degree in Math except the BA in Secondary Math Education, the BS

MATH 384  TEACHING AND LEARNING SECONDARY MATHEMATICS II  4
Explores the evaluation and selection of materials for teaching mathematics in secondary schools, effective instructional strategies, and assessment. Addresses classroom management, equity, meeting the needs of all students, and establishing an effective learning environment. Stresses reasoning, proof, and communication. Examines the teaching and learning of Geometry, Probability & Statistics, Calculus, and Modeling and incorporates content specific use of technology. Includes a field experience.
PREREQ: MATH379. Passing scores on all sections of the Praxis I exam. RESTRICTIONS: Requires permission of the Committee on Secondary School Mathematics. This course cannot count towards the Minor in Math or any other degree in Math except the BA in Secondary Math Education, the BS in Secondary Math Education, and the Honors versions of
MATH 401  INTRODUCTION TO REAL ANALYSIS  3
A rigorous treatment of one variable calculus. Topics will include sequences of real numbers, limit theorems, monotone sequences, Cauchy sequences, Bolzano-Weierstrass Theorem, continuity, uniform continuity, differentiability and Riemann integral. A historical perspective on the development of these topics will be provided.
PREREQ: MATH245

MATH 426  COMPUTATIONAL MATHEMATICS I  3
Floating point numbers; conditioning and stability; LU, Cholesky, and QR factorizations; square and overdetermined linear systems; Newton and quasi-Newton rootfinding methods; piecewise polynomials for interpolation, integration, and finite differences; explicit methods for initial-value problems. Prerequisites: MATH 305, MATH 349, or MATH 351. Students may not receive credit for both MATH 353 and MATH 426.
May be crosslisted with CISC410. PREREQ: MATH305 or MATH351 or MATH349.
RESTRICTIONS: Requires familiarity with computing (e.g., programming language).

MATH 428  COMPUTATIONAL MATHEMATICS II  3
Eigenvalue and singular-value decompositions; power and Krylov subspace iterations; global interpolation and quadrature; methods for boundary-value problems and Poisson’s equation; implicit solvers for stiff problems; method of lines for partial differential equations; diffusion and advection problems. May be crosslisted with CISC411. PREREQ: MATH426 or CIS410 or MATH353.

MATH 450  MATHEMATICAL STATISTICS  3
Introduction to mathematical aspects of statistics. Topics include exploratory data analysis, parameter estimation, maximum likelihood method, testing of hypothesis, confidence intervals and others. Includes application of a computer software package to perform data analysis.
PREREQ: MATH350 or an equivalent course in probability

MATH 451  ABSTRACT ALGEBRA I  3
Basic properties of the integers and the rationals, fields of quotients, polynomial rings, root-finding, introduction to groups, rings and fields. A historical perspective on the development of the notion of number and algebraic structure.
PREREQ: MATH349 and MATH245.

MATH 460  INTRODUCTION TO SYSTEMS BIOLOGY  3
Systems biology approach, mathematical modeling of biological systems; examples from biomedical and agricultural research areas, biotechnology, industrial processes, and others. Differential equations, stochastic, feedback and control, or network models are discussed. Hands-on work via PBL modules. May be crosslisted with CHEG460. PREREQ: One of BISC302, BISC305, BISC306, BISC401 or BISC403.

MATH 466  INDEPENDENT STUDY  1-6

MATH 503  ADVANCED CALCULUS AND NONLINEAR DYNAMICS  3
Change of variables, surface integrals, Stokes’ Theorem, Divergence Theorem, Calculus of Variations, Euler’s Equation, Brachistochrone and isoperimetric problems. Introduction to the qualitative theory of ordinary differential equations, including linear systems, phase space analysis, Lyapunov’s Methods, and elements of the analysis of nonlinear systems.
PREREQ: 300 level or above courses in ordinary differential equations and linear algebra.

MATH 508  INTRODUCTION TO COMPLEX VARIABLES AND APPLICATIONS  3
Introduction to analytic functions, contour integration, power series, residues and conformal mapping.
PREREQ: MATH243

MATH 512  CONTEMPORARY APPLICATIONS OF MATHEMATICS  3
Provides hands-on learning experience in contemporary applications of mathematics. Involves work with investigators from industry, national laboratories and other departments. Mathematical topics may include ordinary and partial differential equations, systems of differential equations, transform, asymptotic and numerical methods.
PREREQ: A 300 or higher level course on differential equations.

MATH 518  MATHEMATICAL MODELS AND APPLICATIONS  3
Illustration and analysis of mathematical models for problems in the biological, physical and social sciences.
PREREQ: MATH243 and MATH349 or MATH350. RESTRICTIONS: Cannot be used to satisfy the requirements for a minor in Math or the requirements of any Math degree except the XMS BAAS and the XMS BS degrees.

MATH 529  FUNDAMENTALS OF OPTIMIZATION  3
PREREQ: Linear algebra (MATH349 or equivalent) and vector calculus (MATH243 or equivalent).

MATH 530  APPLICATION OF MATHEMATICS IN ECONOMICS  3
Provides students with experience in the application of mathematics in economics. Applications may vary from semester to semester. Mathematical topics may include applications of ordinary and partial differential equations, game theory, linear program dynamic programming, stochastic programming and calculus of variations.
May be crosslisted with ECON350. PREREQ: MATH302, MATH 349, ECON301 and ECON303.

MATH 535  INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS  3
Theory and applications of parabolic, elliptic and hyperbolic partial differential equations originating from various mathematical physics problems.
PREREQ: MATH302 or MATH342 or MATH352.

MATH 540  COLLEGE GEOMETRY: A HISTORICAL APPROACH  3
Historical development of the axiomatic systems in geometry, inauguration of deductive reasoning introduced by the Greeks (Euclid) along with the axiomatic developments, extensions, algebraic methods and geometric properties which followed. Plane, analytic, transformational and projective geometries are included.
PREREQ: MATH245 RESTRICTIONS: Graduate credit only for teachers.

MATH 549  CODING THEORY AND CRYPTOGRAPHY  3
Basic coding theory including correcting and detecting error patterns. Cryptography, including symmetric key encryption, DES, RSA and cryptographic protocols.
PREREQ: MATH341 or MATH349 or MATH351.

MATH 579  GEOMETRY AND PROOF  3
In-depth study of high school geometry from an advanced perspective. Logic and proof provide a foundation for studying axiomatic systems, transformational geometry, and finite geometries.
PREREQ: An undergrad. degree in mathematics or in secondary mathematics education. RESTRICTIONS: Open only to School of Education graduate students, Alternative Routes to Certification Program, practicing secondary mathematics teachers, or by permission of instructor.

MATH 580  ANALYSIS FOR ADVANCED PLACEMENT CALCULUS TEACHERS  3
Prepares high school mathematics teachers to teach Advanced Placement Calculus. AP content, primarily from the AB course, is studied in depth. Participants analyze recent AP Examinations, scoring rubrics and student responses.
PREREQ: An undergrad. degree in mathematics or in secondary mathematics education. RESTRICTIONS: Open only to School of Education graduate students, Alternative Routes to Certification Program, practicing secondary mathematics teachers, or by permission of instructor.

MATH 581  ON THE NATURE OF PROOF  3
Designed for secondary teachers to show how to investigate a problem, develop ideas, test conjectures, and, if appropriate, prove that resulting statements are correct. Problems, including proofs, are chosen from the areas of algebra, pre-calculus, geometry and number theory.
PREREQ: BA/BS Math or Math Ed RESTRICTIONS: Credit to be used only in graduate programs in mathematics education.

MATH 582  STUDIES IN DISCRETE MATHEMATICS  3
Designed to show secondary teachers how discrete mathematics underlies the science and technology specific to the computer age. Using the NCTM Standards as a guide, topics include relations, combinatorics, graph theory, sequences, and linear programming, as well as associated algorithms.
PREREQ: MATH581 RESTRICTIONS: Credit to be used only in graduate programs in mathematics education.

MATH 583  PROBABILITY AND STATISTICS FOR EDUCATION  3
Designed specifically for middle and secondary teachers. Topics include graphical methods, probability models, statistical inference and study design. Orientation to popular software packages. Applications selected from current literature.
PREREQ: Undergraduate statistics course RESTRICTIONS: Credit to be used only in graduate programs in mathematics education.

MATH 584  ADVANCED SECONDARY MATHEMATICS METHODS  3
Designed to develop perspectives, knowledge, and frameworks which an inservice teacher can use to organize, interpret and critique their own teaching experience and that of others.
RESTRICTIONS: Requires permission of instructor. Credit to be used only in graduate programs in mathematics education.

MATH 585  TECHNOLOGY IN SECONDARY MATHEMATICS  3
Major emphasis on learning how to use computer software to enhance both the teaching and learning of algebra, geometry, statistics, probability and precalculus. Participants gain hands-on experience with a function plotter, spreadsheet, geometry package and a statistic/probability package.
RESTRICTIONS: Working knowledge of graphing calculators. Credit to be used only in graduate programs in mathematics education.
MATH 586  MATHEMATICAL PROBLEM SOLVING: THEORIES AND PRACTICES
Designed to offer secondary teachers an opportunity to face and solve nonroutine problems. Teachers become familiar with problem solving strategies used not only with nonroutine problems but also with standard problems in an existing mathematics curriculum. RESTRICTIONS: Requires permission of instructor. Credit to be used only in graduate programs in mathematics education.

MATH 587  PROPORTIONAL REASONING
Introduces and reinforces the underlying concepts of proportional reasoning and their applications in science.
RESTRICTIONS: Restricted to middle school mathematics and science teachers.

MATH 588  GEOMETRY AND MEASUREMENT FOR MIDDLE SCHOOL TEACHERS
Properties of 2-D and 3-D figures; measurement of length, area and volume; spatial relationships; transformations; connections with coordinate geometry; fundamentals of deductive system; van Hiele model of development of geometric reasoning, and use of Geometer’s Sketchpad software to enhance package to enhance both teaching and learning of geometry and measurement. May be crosslisted with EDUC588.

MATH 589  QUANTITATIVE LITERACY AND SCIENTIFIC INQUIRY
Connects mathematics and science in fundamental ways. Statistical methods used to construct scientific knowledge through evaluation of evidence and support for explanations. Scientific contexts used to investigate major statistical questions such as “Are two populations demonstrably the same or different on a given variable?”
RESTRICTIONS: Open only to School of Education graduate students, Alternative Routes to Certification Program, practicing secondary mathematics teachers, or by permission of instructor.

MATH 590  PATTERNS AND ALGEBRA FOR MIDDLE SCHOOL TEACHERS
Mathematical modeling and multiple representations used as overarching themes in development of algebraic concepts across grades 6-11. Topics introduced in problem-based settings, with graphing calculators used throughout. PREREQ: MATH587 or permission of instructor. RESTRICTIONS: Open only to School of Education graduate students, Alternative Routes to Certification Program, practicing teachers, or by permission of instructor.

MATH 591  IMPLEMENTING EXEMPLARY CURRICA: MIDDLE SCHOOL MATHEMATICS
Explores how exemplary middle school mathematics curricula promote the development of students’ mathematical understandings and provides a context for best classroom practices. Examines in-depth topics in number and operations, algebra, geometry, measurement, and/or data analysis.
RESTRICTIONS: Open only to School of Education graduate students, Alternative Routes to Certification Program, practicing teachers, or by permission of instructor.

MATH 600  FUNDAMENTALS OF REAL ANALYSIS
PREREQ: MATH401 or equivalent. RESTRICTIONS: Undergraduate students must have a B or better in six credits of MATH at the 400 level or 500 level, exclusive of MATH518 and MATH540.

MATH 602  MEASURE, INTEGRATION AND COMPLEX VARIABLES
PREREQ: MATH600. RESTRICTIONS: Undergraduate students must have a B or better in six credits of MATH at the 400 level or 500 level, exclusive of MATH518 and MATH540.

MATH 607  SURVEY OF SCIENTIFIC COMPUTING
Numerical solution of linear systems; interpolation; differentiation and quadrature; transforms/FFT; nonlinear equations; initial value problems; boundary value problems; Monte Carlo methods; finite difference methods for partial differential equations. Additional topics at the discretion of the instructor.
PREREQ: Linear algebra, differential equations, multivariable calculus.
RESTRICTIONS: This course may not be taken for credit toward degree programs in Mathematical Sciences.

MATH 611  INTRODUCTION TO NUMERICAL DISCRETIZATION
Piecewise polynomial and global interpolation, adaptive, Gaussian, and multidimensional quadrature, Runge-Kutta and multistep methods for initial value problems, finite differences for boundary value problems, method of lines for partial differential equations.
PREREQ: Multivariate calculus and ordinary differential equations. RESTRICTIONS: Undergraduate students must have a B or better in six credits of MATH at the 400 level or 500 level, exclusive of MATH518 and MATH540.

MATH 612  COMPUTATIONAL METHODS FOR EQUATION SOLVING AND FUNCTION MIN
LU and QR factorizations, singular value and eigenvalue decompositions, matrix conditioning, solution of linear systems and linear least-squares problems, iterative methods in linear algebra, descent and quasi-Newton methods of optimization, globalizing convergence, constrained optimization, applications. PREREQ: Elementary linear algebra and programming. RESTRICTIONS: Undergraduate students must have a B or better in six credits of MATH at the 400 level or 500 level, exclusive of MATH518 and MATH540.

MATH 616  MODELING IN APPLIED MATHEMATICS
Introduction to modeling and analytical techniques used in solving problems arising in a variety of physical settings. Biological modeling. Derivation of the equations of mathematical physics. Solution behavior of nonlinear systems of ODE’s. Use of software to explore solutions to physical systems.
PREREQ: One semester of advanced calculus. RESTRICTIONS: Undergraduate students must have a B or better in six credits of MATH at the 400 level or 500 level, exclusive of MATH518 and MATH540.

MATH 617  TECHNIQUES OF APPLIED MATHEMATICS
Introduction to techniques used in solving problems arising in a variety of physical settings. Sturm-Liouville problems and Green’s functions. Methods of solution for the wave, heat and Laplace equations. Variational principles.
PREREQ: One semester of advanced calculus. RESTRICTIONS: Undergraduate students must have a B or better in six credits of MATH at the 400 level or 500 level, exclusive of MATH518 and MATH540.

MATH 630  PROBABILITY THEORY AND APPLICATIONS
Introduction to probability theory as background for further work in statistics or stochastic processes. Sample spaces and axioms of probability; discrete sample spaces; having equally likely events; conditional probability and independence; random variables and describing their distributions; classical discrete and continuous random variables; mathematical expectation and moments of a distribution; the distribution of a function of a random variable; Chebyshev’s inequality; the law of large numbers; central limit theorem.
PREREQ: One semester of advanced calculus. RESTRICTIONS: Undergraduate students must have a B or better in six credits of MATH at the 400 level or 500 level, exclusive of MATH518 and MATH540.

MATH 631  INTRODUCTION TO STOCHASTIC PROCESSES
Classical stochastic processes with emphasis on their properties which do not involve measure theory. Markov chains in discrete and continuous time with examples from random walk, birth and death processes, branching processes and queuing theory. Renewal and Markov renewal processes. Basic notions of Brownian motion and second-order processes.
PREREQ: MATH630 or equivalent. RESTRICTIONS: Undergraduate students must have a B or better in six credits of MATH at the 400 level or 500 level, exclusive of MATH518 and MATH540.

MATH 650  ALGEBRA I
Properties of integers, commutative rings, finite fields, elementary group theory, and classification of finite abelian groups.
PREREQ: MATH672 or permission of instructor. RESTRICTIONS: Undergraduate students must have a B or better in six credits of MATH at the 400 level or 500 level, exclusive of MATH518 and MATH540.

MATH 660  INTRODUCTION TO SYSTEMS BIOLOGY
Systems biology approach, mathematical modeling of biological systems; examples from biomedical and agricultural research areas, biotechnology, industrial processes, and others. Differential equations, stochastic, feedback and control, or network models are discussed. Hands-on work via PBL modules.
PREREQ: The equivalent of CHEM527, MATH335 and one of BISC302, 305, 306, 401 or 403. RESTRICTIONS: No graduate credits given for graduate students in mathematics and applied mathematics.

MATH 668  SEMINARS-COLLOQUIA
1 Requires attendance at 8 departmental seminars/colloquia each semester. A written summary on one of the talks must be submitted to the graduate chair.
RESTRICTIONS: Required of all M5 and Ph.D. students in their first and second years. For meeting the requirement each semester students receive one credit.

MATH 672  VECTOR SPACES
Vector spaces, linear transformations, decomposition theorems and bilinear forms.
PREREQ: MATH349. RESTRICTIONS: Undergraduate students must have a B or better in six credits of MATH at the 400 level or 500 level, exclusive of MATH518 and MATH540.

MATH 688  COMBINATORICS AND GRAPH THEORY
1 Enumeration techniques, Ramsey theory, topics from graph theory, extremal combinatorics, introduction to finite geometry.
PREREQ: Requires permission of instructor. RESTRICTIONS: Undergraduate students must have a B or better in six credits of MATH at the 400 level or 500 level, exclusive of MATH518 and MATH540.
MATH 806 FUNCTIONAL ANALYSIS 3
Fundamental results for normed linear spaces with special emphasis on the theory of Hilbert space, spectral theorems and application to integral and differential equations.
PREREQ: MATH602

MATH 810 ASYMPTOTIC AND PERTURBATION METHODS 3
Asymptotic expansions of real and complex integrals; singular perturbation theory for ODEs and PDEs, WKJB and multiple-scale expansion techniques. Selected applications.
PREREQ: MATH617 and knowledge of analytic function theory or permission of instructor.

MATH 817 INTRODUCTION TO NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS 3
Accuracy, stability, and convergence of finite difference discretizations of partial differential equations, numerical dispersion and dissipation, Fourier and Chebyshev spectral methods, boundary conditions, coordinate mapping, collocation methods, fast multiple methods, applications and other topics at the discretion of the instructor.
PREREQ: MATH611 and MATH612 or equivalent.

MATH 827 TOPOLOGY 3
Generation and properties of topological spaces including connectedness and compactness. Continuity, separation and countability properties; convergence of nets and filters.

MATH 829 TOPICS IN MATHEMATICS 3
Topics vary and are chosen from a variety of areas in pure and applied mathematics. PREREQ: Requires permission of instructor.

MATH 835 EVOLUTIONARY PARTIAL DIFFERENTIAL EQUATIONS 3
Methods of solution for evolutionary partial differential equations and systems primarily from a classical perspective. Linear and nonlinear equations and systems; characteristics; shocks and discontinuous solutions; similarity solutions; modern applications and dynamical systems approaches.
PREREQ: MATH617 or equivalent.

MATH 836 ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS 3
Sobolev spaces, potential theory, variational methods for elliptic equations, inverse problems.
PREREQ: MATH806.

MATH 838 FINITE ELEMENT AND BOUNDARY ELEMENT METHODS 3
PREREQ: MATH806 or equivalent.

MATH 845 ALGEBRA II 3
Ternary rings and their relationship to finite geometry, Sylow's theorems and group actions, classical matrix groups, linear representations, character theory. Computational software such as Magma or Maple will be used.
PREREQ: MATH650 and MATH672 or permission of instructor.

MATH 850 THEORY OF PROBABILITY 3
Mathematically rigorous treatment of probability theory with emphasis on methods and tools for applications. Axioms of probability and independence. An introduction to large deviation theory and Martingale theory. Probabilistic methods in combinatorics and analysis.
PREREQ: MATH602 or MATH631 or equivalent; or permission of instructor.

MATH 868 RESEARCH 1-6

MATH 869 MASTER'S THESIS 1-6

MATH 870 READING IN MATHEMATICS 1-6

MATH 888 COMBINATORICS II 3
Algebraic graph theory, linear algebraic methods, designs, codes, geometry. Computational software, such as Magma or Maple, will be used.
PREREQ: MATH672, MATH688. COREQ: MATH650.

MATH 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.

MATH 969 DOCTORAL DISSERTATION 1-12 PF

MATERIAL CULTURE STUDIES

MCST 216 INTRODUCTION TO MATERIAL CULTURE STUDIES 3
Introduces students to material culture studies, broadly defined as study of all things people make and all the ways people have altered the physical world. Explores the approaches, concepts, and methods of numerous disciplines that investigate material culture.
Crosslisted with ANTH216.

MCST 243 DESIGN AND THE DECORATIVE ARTS 3
Introduction to the design histories and decorative arts of American and European cultures from the 18th century to the present. Examines the historical emergence of design styles (from Chippendale to modern) and forms (such as furniture, ceramics, and craft) while exploring histories of production, consumption, and circulation through global trade and cultural networks. Field trips to area museums may be required.
Crosslisted with ART243.

MCST 299 RESEARCH IN MATERIAL CULTURE STUDIES 1
Wide-ranging, interdisciplinary lectures in which faculty and advanced graduate students discuss their research on the broad topic of material culture studies, or stuff studies, investigations into the relationship between people and their things. May be repeated for credit when topics vary.

MCST 402 MATERIAL CULTURE STUDIES RESEARCH SEMINAR 3
Balanced emphasis on writing skills, research strategies and interpretation related to the study of material culture. Students will develop research projects drawing on the collections of local and regional personal collectors, museums, libraries, and historical agencies.
PREREQ: ANTH216 or permission of instructor.

MCST 435 SEMINAR IN AMERICAN ART 3-12
American art from the Colonies to the present. Recent topics include Art and Revolution in Early America; Early American Modernism, and American Painting and Sculpture after World War II.
Crosslisted with ART435. RESTRICTIONS: May be repeated for credit when topics vary.

MCST 449 SOCIOLOGY OF ART AND CULTURE 3
Introduction to sociological perspectives on culture and the arts. Topics include the role of culture in the creation of social inequality, fashion, the social production of art, the culture industry, and outsider art.
Crosslisted with SOCI449.

MCST 464 MATERIAL CULTURE STUDIES INTERNSHIP 3-6
Provides practical behind-the-scenes experience in collections management, public programming, exhibition design, interpretation, or other aspects of professional life in such cultural institutions as museums, historical societies, or research agencies. To qualify for an internship a minor must demonstrate initiative, motivation, and appropriate skills through a review process. Students select internship placements from a list maintained by the Center for Material Culture Studies or seek approval for internship of their choice outside that list.
PREREQ: ANTH216. RESTRICTIONS: Open to minors only.

MCST 466 INDEPENDENT STUDY 1-6

MEDICAL LABORATORY SCIENCES

MEDT 100 INTRODUCTION TO MEDICAL LABORATORY SCIENCE 1
Orientation to the profession of medical laboratory science with overview of clinical laboratory science areas. Discussion of the laboratory's critical role in healthcare delivery and the diversity of employment and career opportunities.
RESTRICTIONS: Open to Freshmen, Sophomores and Juniors.

MEDT 160 INFECTION: SEX, FOOD AND SNEEZING 3
This course will educate students about microorganisms affecting our lives. Lecture will concentrate on good and bad organisms, especially those problematic for college students. Students will learn from case studies for organism-infection association and will discuss society's treatment, control and prevention of infection.
MEDT 200 THE LANGUAGE OF MEDICINE 3
Comprehensive foundation of medical terminology for use in health care careers. Emphasis on body structures, anatomical systems, pathologies, medical procedures, medical specialties, and common terms and abbreviations used in health care.

MEDT 220 FORENSIC SCIENCE 3
Introduction to the field of forensic science, discussing laboratory techniques and assays used in determining evidential value of crime scene and related evidence. Emphasis on blood and DNA analysis, forensic toxicology, and forensic microbiology.

MEDT 230 FORENSIC PATHOLOGY 3
Overview of the field of forensic pathology including the history, related specialties, and determining the cause of death. Medical examiners/coroners system, hospital pathology and legal/ethical issues in forensic science are also discussed.

MEDT 240 CRIME SCENE INVESTIGATION 3
Crime scene investigation techniques are covered with an emphasis upon securing and recording the crime scene, identifying and preserving physical evidence, collecting, transporting and storing evidence and the examination of evidence. Techniques available to the crime scene investigator also will be discussed.

MEDT 250 COMMUNICATION, EDUCATION, & ETHICS IN HEALTHCARE 1
Focuses on tools to achieve effective interpersonal and interdisciplinary communication. Includes the use of educational methodology to instruct laboratory personnel, as well as other practitioners and consumers who utilize laboratory services. Discussion of ethics and professionalism in relationship to health-related topics.

RESTRICTIONS: Open to Medical Laboratory and Diagnostics Interest and Medical Laboratory Science majors only.

MEDT 270 MEDICAL MICROBIO & INFECTIOUS DISEASES 4
Introduction to principles of human medical microbiology. Bacterial pathogenic mechanisms, clinical manifestations, and diagnostic methods are emphasized. Explores important human viral and parasitic diseases, antimicrobial agents, immunology and immune disorders.

PREREQ: BISC207 or BISC205.

MEDT 360 CLINICAL IMMUNOLOGY AND MEDICAL VIROLOGY 3
Introductory immunology concepts and use of immunological assays, such as enzyme immunoassays and fluorescent antibody assays, for diagnosis of infectious diseases and immunological disorders. Study of viruses, diseases they cause, and methods used to diagnose viral infections.

PREREQ: MEDT300 or MEDT310. RESTRICTIONS: Open to Medical Laboratory Science majors and Medical Diagnostic majors and minors, or permission of instructor.

MEDT 362 CLINICAL IMMUNOLOGY AND MEDICAL VIROLOGY LABORATORY 3
Laboratory concepts and immunological assays, such as enzyme immunoassays and fluorescent antibody assays, for diagnosis of infectious diseases and immunological disorders.

PREREQ: BISC208 and CHEM104 or CHEM108. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 366 INDEPENDENT STUDY 1-6

MEDT 370 PHLEBOTOMY PRACTICUM 1
Introduction to the theory and performance of phlebotomy. Supervised clinical experience in the application of laboratory theory and techniques in phlebotomy.

RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 375 STATISTICS & RESEARCH FOR MEDICAL LABORATORY SCIENTISTS 2
Introductory statistics, principles of research design and data interpretation for medical laboratory scientists.

RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 390 INTRODUCTION TO GENETICS AND MOLECULAR DIAGNOSTICS 3
Study of genetics, molecular biology principles and techniques as it applies to the clinical laboratory for use in diagnosis, prognosis and treatment of disease. Topics include Mendelian genetics, principles of DNA, RNA, and proteins, and the use of molecular techniques in diagnosis.

PREREQ: BISC208 and CHEM104 or CHEM108. RESTRICTIONS: Not open to Medical Laboratory and Diagnostics Interest students.

MEDT 391 INTRODUCTION TO MOLECULAR DIAGNOSTICS LABORATORY 1
Laboratory exercises that correlate with MEDT390. Techniques include isolation of nucleic acids from biological fluids, electrophoresis, PCR, viral load testing and DNA sequencing.

PREREQ: MEDT390. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 398 BODY FLUID ANALYSIS 1
Overview of protocols, technical and clinical correlations involved in body fluid analysis of non-blood body fluids, including urine, synovial, cerebrospinal, seminal, serous, amniotic and gastric fluids.

PREREQ: BISC208 and CHEM104 or CHEM108. RESTRICTIONS: Open to Medical Laboratory Science majors and minors and Medical Laboratory Science majors only; requires permission from instructor for all others.

MEDT 399 BODY FLUID ANALYSIS LABORATORY 1
Performance of diagnostic laboratory testing of body fluids, including quality assurance and troubleshooting techniques.

PREREQ: BISC208 and CHEM104 or CHEM108. COREQ: MEDT398. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 401 CLINICAL PHYSIOLOGICAL CHEMISTRY I 3

PREREQ: BISC208 and CHEM104 or CHEM108. RESTRICTIONS: Not open to Medical Laboratory and Diagnostics Interest students.

MEDT 403 CLINICAL PHYSIOLOGICAL CHEMISTRY II 3
Application and theory of methodologies in enzymology, endocrinology and toxicology. Relationship of normal and abnormal laboratory findings in organ functional tests.

PREREQ: MEDT401.

MEDT 404 HEMATOLOGY I 2
Quantitative and qualitative study of the formed elements of blood with emphasis on the normal state, as well as the study of normal and abnormal coagulation and hemostasis.

PREREQ: BISC208 and CHEM104 or CHEM108. RESTRICTIONS: Not open to Medical Laboratory and Diagnostics Interest students.

MEDT 405 HEMATOLOGY II 2
Study of the pathophysiology of erythrocytic and leukocytic disorders and the laboratory findings of these disorders.

PREREQ: MEDT404.

MEDT 406 MEDICAL MICROBIOLOGY 3
Study of the occurrence and pathogenesis of human infections and microorganisms associated with humans in health and disease.

PREREQ: BISC208 and CHEM104 or CHEM108. RESTRICTIONS: Not open to Medical Laboratory and Diagnostics Interest students.

MEDT 409 IMMUNOHEMATOLOGY I 1
Study of antigen and antibody systems of human red cells and compatibility testing of blood for transfusion.

PREREQ: MEDT360 Clinical Immunology and Medical Virology. RESTRICTIONS: Not open to Medical Laboratory and Diagnostics Interest students.

MEDT 411 CLINICAL PHYSIOLOGICAL CHEMISTRY LABORATORY I 2
Laboratory exercises that complement the topics covered in MEDT401.

COREQ: MEDT401. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 413 CLINICAL PHYSIOLOGICAL CHEMISTRY LABORATORY II 2
Laboratory exercises that complement the topics covered in MEDT403.

COREQ: MEDT403. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 414 HEMATOLOGY I LABORATORY 1
Study and implementation of laboratory procedures that correlate with the material taught in MEDT404.

COREQ: MEDT404. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 415 HEMATOLOGY II LABORATORY 2
Study and implementation of laboratory procedures in hematology consistent with the material taught in MEDT405.

COREQ: MEDT405. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 416 MEDICAL MICROBIOLOGY LABORATORY 2
Study of microorganisms important in the normal flora and infectious diseases of humans.

COREQ: MEDT406. RESTRICTIONS: Open to Medical Laboratory Science majors only.
MEDT 418  SENIOR SEMINAR: MEDICAL LABORATORY SCIENCE 0 PF
Readings, case studies, career planning and orientation for clinical education.
RESTRICTIONS: Open to senior Medical Laboratory Science majors only.

MEDT 419  IMMUNOHEMATOLOGY I LABORATORY 1
Laboratory procedures consistent with MEDT409.
COREQ: MEDT409. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 420  IMMUNOHEMATOLOGY II 2
Study of blood and component transfusions, their risks, complications and quality assurance. Also blood component therapy and testing of the neonate and adult.
PREREQ: MEDT409.

MEDT 421  IMMUNOHEMATOLOGY II LABORATORY 1
Laboratory procedures consistent with MEDT420.
COREQ: MEDT420. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 430  DIAGNOSTIC BACTERIOLOGY AND MEDICAL MYCOLOGY 2
Diagnostic bacteriology, emphasizing the correlation of in vitro and in vivo findings in the diagnosis and treatment of infectious disease, including human mycoses. Identification of pathogenic and nonpathogenic bacteria and fungi in clinical specimens.
PREREQ: MEDT360 and MEDT406.

MEDT 431  DIAGNOSTIC BACTERIOLOGY AND MEDICAL MYCOLOGY LABORATORY 2
Study and implementation of laboratory procedures that correlate with the material taught in MEDT430.
COREQ: MEDT430. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 440  INTRODUCTORY NANOMEDICINE 3
Introduction to the interdisciplinary field of nanomedicine for students with physical, chemical or biological sciences background. Emphasis on emerging nanotechnologies and biomedical applications including nanoparticles, nanotechnology-based drug delivery systems, nano-particle-based imaging, nanodiagnostic systems, toxicology, and translating nanomedicines into clinical research.
PREREQ: BISC208 or CHEM104 or CHEM108 or CHEM112 and CHEM120.

MEDT 455  FORENSIC SCIENCE PRACTICUM 3 PF
Working with practicing criminalists, students gain hands-on real life experience in the exciting field of forensic science. Students will be given the opportunity to develop an appreciation for the analyses performed in a forensic science laboratory.
PREREQ: CRUI110 and MEDT220.

MEDT 460  TECHNIQUES IN NANOMEDICINE 3
Chemical and physical approaches used to make functionalized nanoparticles and their characterizations with spectroscopy including Fourier transform infrared spectroscopy (FTIR), UV and visible, scanning electron microscope (SEM), transmission electron microscope (TEM) and nuclear magnetic resonance (NMR).
PREREQ: BISC208 or CHEM104 or CHEM108 or CHEM112 and CHEM120.
RESTRICTIONS: Requires permission of instructor.

MEDT 461  LABORATORY PRACTICE AND LEADERSHIP I 1
Introduction to clinical laboratory practice and leadership with emphasis on management styles, motivational techniques, communication skills, organizational leadership and administration of personnel.
RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 462  EXPERIENTIAL LEARNING 3
Final reflective component of the volunteer experiences accumulated throughout the student's undergraduate years in preparation for a graduate program in a healthcare field. Evidence of critical thinking and knowledge of healthcare concepts will be demonstrated through various assignments.
RESTRICTIONS: Open to Medical Diagnostics senior majors only or with permission of the department.

MEDT 466  INDEPENDENT STUDY 1-6

MEDT 471  LABORATORY PRACTICE AND LEADERSHIP II 1
Discussion of clinical laboratory practice and leadership. Emphasis on responsibilities relating to daily operation of the laboratory, including human resource management, financial planning, cost analysis, laboratory design, laboratory information systems, marketing, government regulations and accreditation.
PREREQ: MEDT461.

MEDT 472  CLINICAL URINALYSIS PRACTICUM 1 PF
Clinical experience in the application of laboratory theory and techniques in urinalysis.
PREREQ: MEDT398 and MEDT399. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 473  CLINICAL CHEMISTRY PRACTICUM 3 PF
Supervised experience in the application of laboratory theory and techniques in clinical chemistry.
PREREQ: MEDT403 and MEDT413. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 474  HONORS CLINICAL CHEMISTRY PRACTICUM 3
Supervised experience in the application of laboratory theory and techniques in clinical chemistry.
PREREQ: MEDT403 and MEDT413. RESTRICTIONS: Open to Honors students only -- min. 3.0-GPA required. See www.udel.edu/honors for enrollment policies. Requires permission from the instructor. Open to Medical Laboratory Science majors only.

MEDT 475  CLINICAL HEMATOLOGY PRACTICUM 3 PF
Supervised experience in the application of laboratory procedures in hematology.
PREREQ: MEDT405 and MEDT415. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 476  HONORS CLINICAL HEMATOLOGY PRACTICUM 3
Supervised experience in the application of laboratory procedures in hematology.
PREREQ: MEDT405 and MEDT415. RESTRICTIONS: Open to Honors students only -- min. 3.0-GPA required. See www.udel.edu/honors for enrollment policies. Requires permission from the instructor. Open to Medical Laboratory Science majors only.

MEDT 477  CLINICAL MICROBIOLOGY PRACTICUM 3 PF
Supervised experience in the application of laboratory procedures in diagnostic microbiology.
PREREQ: MEDT430 and MEDT431. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 478  HONORS CLINICAL MICROBIOLOGY PRACTICUM 3
Supervised experience in the application of laboratory procedures in diagnostic microbiology.
PREREQ: MEDT430 and MEDT431. RESTRICTIONS: Open to Honors students only -- min. 3.0-GPA required. See www.udel.edu/honors for enrollment policies. Requires permission from the instructor. Open to Medical Laboratory Science majors only.

MEDT 479  CLINICAL IMMUNOHEMATOLOGY PRACTICUM 3 PF
Supervised experience in the application of laboratory procedures in immunohemato.
PREREQ: MEDT420 and MEDT421. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 480  SENIOR CAPSTONE 1
Enhances problem-solving skills by integrating multiple clinical laboratory disciplines utilizing literature reviews to assess case studies. Focuses on integration and synthesis of knowledge acquired in previous courses while enhancing written and oral communication and presentation skills. Includes written assessment of all clinical laboratory disciplines.
COREQ: MEDT473, MEDT475, MEDT477, MEDT479. RESTRICTIONS: Open to Medical Laboratory Science majors only.

MEDT 481  HNRS CLINICAL IMMUNOHEMATOLOGY PRACTICUM 3
Supervised experience in the application of laboratory procedures in immunohemato.
PREREQ: MEDT420 and MEDT421. RESTRICTIONS: Open to Honors students only -- min. 3.0-GPA required. See www.udel.edu/honors for enrollment policies. Requires permission from the instructor. Open to Medical Laboratory Science majors only.

MEDT 500  GENETICS AND MOLECULAR DIAGNOSTICS FOR CLINICAL LAB 3
Molecular diagnostics topics emphasize DNA, RNA and protein structure and function, including detailed review of the central dogma. Genetic topics emphasize cell development, chromosome structure and function, and disease inheritance patterns.
PREREQ: BISC208, CHEM104 or equivalents, or by permission of the Department.

MEDT 501  MOLECULAR DIAGNOSTICS 3
Molecular processes required to diagnose inherited disorders, cancer, hematological disorders, and infectious agents. Additionally, the employment of DNA identity based testing in transplantation, paternity testing and forensics will be discussed.
PREREQ: MEDT500. RESTRICTIONS: Minimum grade of C- in MEDT500.
MEDIT 502 APPLICATION OF MOLECULAR DIAGNOSTICS TECHNIQUES 3
Molecular techniques commonly employed in the clinical molecular diagnostics laboratory are presented.
PREREQ: MEDIT500 and MEDIT501. RESTRICTIONS: Minimum grade of C- in MEDIT500 and in MEDIT501.

MEDIT 640 ADVANCED NANOMEDICINE 4
Emphasis is placed on emerging nanotechnologies and biomedical applications, including nanomaterials, nanobiotechnology, and drug delivery systems. Nanoparticle-based imaging, nanodiagnostics, and nanomedicines are discussed.
PREREQ: BISC208 or CHEM104 or CHEM108 or CHEM112 and CHEM120.
RESTRICTIONS: Requires permission of Instructor.

MEDIT 660 ADVANCED TECHNIQUES IN NANOMEDICINE 4
Emphasis is on nanotechnology-based bio-imaging and chemical and physical approaches used to model functionalized nanoparticles and their characteristics with spectroscopy including Raman, infrared, UV and visible spectroscopy, and scanning electron microscopy.
PREREQ: BISC208 or CHEM104 or CHEM108 or CHEM112 and CHEM120.
RESTRICTIONS: Requires permission of instructor.

MEDIT 800 PREPARING RESEARCH PROPOSALS 3
Comprehensive practical experience in the design and writing of research proposals on the level of NIH/NSF grant funding.
RESTRICTIONS: Open to graduate students only.

MEDIT 803 GRADUATE RESEARCH SEMINAR 1
Seminar, allowing graduate students to report on the progress of their research and discuss the current literature on their research focus.

MEDIT 804 GRADUATE RESEARCH SEMINAR 0
Seminar, taken after achieving candidacy, allowing graduate students to report on the progress of their research and discuss the current literature on their research focus.
RESTRICTIONS: Open to students following successful completion of their candidacy examination.

MEDIT 805 BIOMARKER DEVELOPMENT 3
Focus on the critical thinking processes involved in the development of a diagnostically usable biomarker: target identification, proof of mechanism, proof of concept, treatment/safety monitoring, outcome measurement, predictive value.

MEDIT 810 EVIDENCE BASED PRACTICE 3
Theoretical and practical concepts to integrate clinical expertise, patient values, and research evidence into decision making for patient care. Emphasis on efficient literature searching, application of rules of evidence in evaluating the clinical literature, and best study designs for the question to be asked.

MEDIT 868 RESEARCH 3
Active involvement in graduate research before completion of required coursework.

MEDIT 969 DOCTORAL DISSERTATION 1-9
Independent dissertation research after completion of the Candidacy Examination.

MEEG 202 COMPUTER-AIDED ENGINEERING DESIGN 3
Introduces computer-aided mechanical engineering design by developing student’s ability to (1) think visually, 2) communicate spatial information to an engineering audience through parametric solid modeling drafting standards and 3) begin to recognize connection between a virtual design and an actual component.

MEEG 211 DYNAMICS 3
Intermediate-level development of the kinematics and dynamics of particle systems and rigid bodies. Solution of engineering problems by force, momentum and energy methods with applications to mechanisms, machines, and vehicles.
PREREQ: Grade of C- or better in MEEG112 or CIEG211.

MEEG 215 MECHANICS OF SOLIDS 3
Analytical study of stresses and deformations and their application to the design of machine and structural elements under axial, torsional, bending and lateral loads. Buckling and energy methods are discussed.
PREREQ: Grade of C- or better in MEEG112 or CIEG211.

MEEG 216 SOLID MECHANICS LAB 1
Mechanics of Solids Laboratory serves to reinforce the theory discussed in Mechanics of Solids lecture through experimental means. The topics studied include: 1) modern measurements and instrument calibration; 2) failure in uniaxial tension; 3) tensile deformation; 4) deformation of composite materials; 5) cantilevered and 3-point beam bending; 6) torsion. The students will learn and reinforce professional skills related to the analysis and communication of technical information.
COREQ: MEEG215.

MEEG 301 MACHINE DESIGN-KINEMATICS AND KINETICS 3
Kinematic analysis of mechanisms and machines, kinematic synthesis, cam design, gear train analysis and machine dynamics.
PREREQ: C- or better in MEEG211 or CIEG311. RESTRICTIONS: Open to majors only.

MEEG 304 MACHINE DESIGN-ELEMENTS 3
Aspects of machine design: statistical nature, theories of failure and design for strength and design of machine elements.
PREREQ: MEEG301 and C- or better in MEEG215 or CIEG212. COREQ: MEEG202.
RESTRICTIONS: Open to majors only.

MEEG 311 VIBRATION AND CONTROL 3
Modeling and simulation of single and multi-degree-of-freedom systems, nonlinear models, linearization, transient and steady state response. Controller designs: root locus, bode plots, PID, digital implementation. PREREQ: C- or better in MEEG211 or CIEG311. RESTRICTIONS: Open to majors only.

MEEG 312 VIBRATION AND CONTROL LAB 1
Vibration and control lab serves to reinforce the theory discussed in vibration and control lecture through experimental means. The topics studied include: 1) system and parameter identification, (ii) time response of dynamical systems to forcing inputs, (iii) development and testing of controllers, (iv) Frequency response of linear dynamical systems, (v) controller designs. The students will learn and reinforce professional skills related to the analysis and communication of technical information.
COREQ: MEEG311.

MEEG 321 MATERIALS ENGINEERING 3
Mechanical properties and materials behavior under static and dynamic loading; fatigue, creep, wear and corrosion; properties and applications of metals, ceramics, polymers and composites; forming and joining of materials; practical examples of materials selection in design and use of materials data bases.
PREREQ: MSEG302 and a C- or better in MEEG215 or CIEG212. RESTRICTIONS: Open to majors only.

MEEG 331 FLUID MECHANICS I 3
Incompressible fluid mechanics: fluid statics, control volume analysis for mass, momentum and energy; differential analysis of viscous and inviscid flow; dimensional analysis.
PREREQ: MATH 351 and a C- or better in MEEG112 or CIEG211. RESTRICTIONS: Open to majors only.

MEEG 332 FLUID MECHANICS II 3
Compressible flows, isentropic flow, shock waves; lift and drag; viscous flows, potential and stream functions, elementary wing theory; boundary layers; computational fluid dynamics.
PREREQ: MEEG331, or CIEG305 in place of MEEG331, and MATH352.
RESTRICTIONS: Open to majors only.

MEEG 333 FLUID MECHANICS LAB 1
Introduction to experimental measurement techniques in fluid mechanics.
COREQ: MEEG331.
MEEG 341 THERMODYNAMICS 3
Basic concepts of thermodynamics including properties of substances and gas mixtures, energy, entropy, and exergy. First and second law analysis of systems and control volumes. Applications to steady-flow devices and systems in power production, propulsion, and air conditioning. COREQ: MATH351. RESTRICTIONS: Open to majors only.

MEEG 342 HEAT TRANSFER 3

MEEG 346 THERMAL LABORATORY 1
Introduction to experimental and measurement techniques related to thermodynamics and heat transfer. PREREQ: MEEG341. COREQ: MEEG342. RESTRICTIONS: Open to majors only.

MEEG 366 INDEPENDENT STUDY 1-6

MEEG 401 SENIOR DESIGN 6
Capstone engineering practice where teams develop real engineering system designs; discover customer requirements; benchmark best practices; develop engineering specifications; generate concepts; and justify aspecific concept. Design, fabricate, assemble, test and improve an actual prototype. PREREQ: MEEG304. RESTRICTIONS: Open to majors only.

MEEG 402 SENIOR DESIGN - FSAE 6
Capstone engineering practice where teams develop real engineering system designs; discover customer requirements; benchmark best practices; develop engineering specifications; generate concepts; and justify aspecific concept. Design, fabricate, assemble, test and improve an actual prototype. Focus is upon successful competition at the annual spring FSAE competition. PREREQ: MEEG304. RESTRICTIONS: Open to majors only.

MEEG 403 FORENSIC FAILURE ANALYSIS 3
Study of the application of Mechanical Engineering in forensic investigation and failure analysis. Case study topics include product liability, injury biomechanics, accident reconstruction, structural failure. Discussion on the role of the engineer as an expert witness in the legal system. RESTRICTIONS: Senior engineering status.

MEEG 413 NANOMATERIALS AND NANOTECHNOLOGY 3
Advanced topics in nanoscience and nanotechnology including nanostructures, nanomaterial synthesis, properties, characterizations, and applications. The emphasis will be to introduce students to the science of the building blocks of nanostructured materials, material behavior when they are assembled, technology for building nanoscale structures and features, nanomaterials for energy conversion and storage, and the technological implications of these nanomaterials and nanotechnologies.

MEEG 414 ANALYSIS OF AIRCRAFT STRUCTURE 3
Deals with analysis and design of flight structures and other light-weight structures. Loads, supports and reactions, constitute equations, and stress and deformation of components for flight vehicles are investigated. Overview of fatigue, vibration (flutter) and instability of structures are given. PREREQ: MEEG215, or CIEG212 in place of MEEG215.

MEEG 417 COMPOSITE MATERIALS 3
Fiber and matrix materials, fiber-matrix interface, polymer, metal, ceramic and carbon matrix composites, geometric aspects, elastic properties, laminate theory, strength of unidirectional composites, strength of laminates, durability, hybrid composites, flexible composites and textile structural composites. PREREQ: MEEG215 or CIEG212 or permission of instructor.

MEEG 419 MECHANICAL BEHAVIOR OF MATERIALS AND STRUCTURES 3
Explores how material properties influence structural response and failure mechanisms under the influence of external loads. Includes plasticity; thermal stresses; fracture and damage mechanics; and buckling. Problem solving based on both analytical methods and computational mechanics. PREREQ: MEEG215, or CIEG212 in place of MEEG215.

MEEG 421 LINEAR SYSTEMS 3
State-space analysis of linear dynamical systems. Solution of state-space equations, and analysis of structural system properties based on eigenvalues and eigenvectors. Similarity transformations and decompositions. Lyapunov stability. Observability and controllability. State feedback control design. PREREQ: MATH349 or MATH351 and MEEG311.

MEEG 422 INTERFACE SCIENCE AND ENGINEERING 3
Materials tribology concerns the material's response to sliding or tribological contact. Moving systems become immobile when tribological materials fail. Provides an introduction to tribology, imparts a basic understanding of interfacial phenomena, and surveys emerging interface challenges in aerospace, wind power, and osteoarthritis applications.

MEEG 424 VEHICLE DYNAMICS 3
Theory of the dynamics of ground vehicles. Topics include tire adhesion, slip angle, suspension analysis and design, chassis design and aerodynamics with downforce generation. PREREQ: MEEG112 or CIEG211, and MEEG211 or CIEG311. RESTRICTIONS: MEEG311 is recommended.

MEEG 425 AUTOMOTIVE POWERTRAIN THEORY 3
Analysis and design of automotive powertrain design with emphasis on competition and efficiency optimization. PREREQ: MEEG301 and MEEG341.

MEEG 432 AERODYNAMICS 3
Theoretical and computational aerodynamics. Review of fluid mechanics. Airfoils and finite wings in incompressible flow. Panel and vortex-lattice methods. Complex variable techniques. Boundary-layer theory. PREREQ: MEEG331 or CIEG305 in place of MEEG331, and MEEG332 or permission of instructor.

MEEG 435 WIND POWER ENGINEERING 3
Includes an historical overview, the energetics of wind power, wind turbine aerodynamics, and the basics of related dynamical, structural and electrical aspects of wind power. There is also a class visit to a nearby wind farm. PREREQ: MEEG332.

MEEG 442 INTRODUCTION TO FUEL CELLS 3
Basic principles of fuel cells, fuel cell types and their applications, fuel processing and hydrogen storage. PREREQ: MEEG331, or CIEG305 in place of MEEG331, and MEEG341 and MEEG342.

MEEG 445 SENIOR RESEARCH I 3
Investigation of an experimental nature to be carried out and reported upon by each student. RESTRICTIONS: Open to seniors only.

MEEG 446 SENIOR RESEARCH II 3
Investigation of an experimental nature to be carried out and reported upon by each student. RESTRICTIONS: Open to seniors only.

MEEG 451 INTRODUCTION TO MICROSYSTEMS 3
This course examines the mechanical, thermal, optical, fluidic, chemical, and biological devices that can be derived using modern microfabrication methods. Topics include typical fabrication steps, device physics and mechanics, and a survey of existing and emerging device areas. PREREQ: PHYS208 or PHYS245 or graduate standing.

MEEG 453 MANUFACTURING PROCESSES AND SYSTEMS 3
Explains key concepts and elements of basic processes (metal cutting, forming, plastic molding), technologies (robotics, ergonomics, material handling, quality management, machine vision), industries/systems (pharmaceutical, automotive, packaging, food, and current advances (lean mfg., just-in-time). PREREQ: MEEG321 or permission of instructor.

MEEG 455 PRINCIPLES OF COMPOSITES MANUFACTURING 3
Fundamental principles and an application involving composites manufacturing are introduced. Modeling of such processes is emphasized and a specific projected is required. Assignments include open-ended problems. Areas of manufacturing include: injection molding, compression molding, filament winding, pultrusion and resin transfer molding. PREREQ: MEEG331 and MEEG342.

MEEG 466 INDEPENDENT STUDY 1-6

MEEG 481 CYTOMECHANICS 3
Cell, the universal unit of life, behaves as a "mechanical living" entity. Besides sensing "smell or taste" mediated by chemical reactions, cells also display a strong sense of "touch" mediated by mechanical interactions. Mechanics is involved in many fundamental processes such as cell shape, mobility, and differentiation. In this course, the students will be exposed to the principles of cytomechanics and the fascinating cellular responses and adaptation to the mechanical environment. PREREQ: BISC207 and MEEG215 or instructor's approval.
MEEG 482 CLINICAL BIOMECHANICS 3
The biomechanics and patho-mechanics of various human musculoskeletal joint systems. Normal joint anatomy and biomechanics; the mechanical effects of pathology and the goals of surgical repairs to counteract them will be explored through laboratory observations, in vitro, in vivo and mathematical modeling studies of joint system mechanics.

MEEG 483 ORTHOPAEDIC BIOMECHANICS 3
Anatomy and physiology including microanatomy and mechanics of bone, cartilage, tendon and muscle. Mechanical modeling of body including joint loads, motion analysis, muscle forces and interaction with orthopaedic devices. PREREQ: MEEG211 and MEEG221 or graduate standing.

MEEG 484 BIOMATERIALS AND TISSUE ENG APP 3
Biomaterials for mechanical replacement of Orthopaedic tissues: bone, cartilage, ligament, tendon and whole joint systems. Topics include normal tissue mechanics and biocompatibility, mechanical behavior, degradation and host response to biomaterials. Experimental methods to assess biomaterials along with design and manufacturing considerations for joint and tissue replacements.

MEEG 485 CONTROL OF HUMAN MOVEMENT 3
Examines current topics in biomechanics research relevant to control of human movement including anatomy of the neuro-musculo-skeletal system, experimental techniques for study of CNS organization, and coordination principles of simple and complex tasks. PREREQ: PHYS201 or 207, or permission of instructor.

MEEG 486 CELLS AND TISSUE TRANSPORT 3
Analysis of water, solute, gas, and heat exchange in microcirculation and relationship between structure and function. Transport in biological porous media examined and applied to arterial wall, bone, and cartilage. Active transport across membranes considered and applied to kidney and secretory organs. Introduction to transport across cell membrane and role of receptors in transport, cell adhesion, and intracellular signaling presented. PREREQ: MEEG331, or CIEG305 in place of MEEG331.

MEEG 600 SEMINAR 0 PF
Lectures by invited scholars on various topics in Mechanical Engineering and related areas.

MEEG 602 INDUSTRIAL DESIGN 3
Provides an introduction to the theory and practice of industrial design - an interdisciplinary field involving the engineering, manufacturing, and business aspects of new product development. Students will apply modeling, prototyping, and testing concepts towards creating a commercially viable product. Crosslisted with ENTR602. PREREQ: ENTR601 or permission from the instructor.

MEEG 603 FORENSIC FAILURE ANALYSIS 3
Study of the application of Mechanical Engineering in forensic investigation and failure analysis. Case study topics include product liability, injury biomechanics, accident reconstruction, structural failure. Discussion on the role of the engineer as an expert witness in the legal system.

MEEG 604 INTEGRATED DESIGN 3
Integrates form (art) and function (engineering) to create user-centered commercial products. Students will work in interdisciplinary teams on design portfolios for industry sponsors. A studio-based course with occasional lectures from faculty and invited guests. PREREQ: MEEG401. RESTRICTIONS: MEEG majors only.

MEEG 610 INTERMEDIATE SOLID MECHANICS 3
Indicial notation, tensors, displacement, strain, compatibility; traction and stress, equations of motion; constitutive description of an elastic material; solutions to boundary value problems including torsion, bending, plane problems in elasticity (Airy stress function) and elements of linear elastic fracture mechanics.

MEEG 611 SANDWICH STRUCTURES 3
Composite and isotropic sandwich structures are studied for stresses, deformations, buckling loads, natural frequencies and dynamic response under mechanical and environmental loads, involving honeycomb, solid, foam, web and transverse sandwich comprising beam, plate, ring and shell structures. Design and minimum weight optimization are treated.

MEEG 612 BIOMECHANICS OF HUMAN MOVEMENT 3
Mechanics of the musculoskeletal system with an emphasis on the control of human movement. Topics include how the nervous system activates muscles, the mechanical properties of skeletal muscle and mechanisms for controlling limb movement. Applications include gait analysis, sports biomechanics and hand trajectory formation. Involves computer modeling of musculoskeletal systems. PREREQ: PHYS201 or PHYS207 or graduate status.

MEEG 613 NANOMATERIALS AND NANOTECHNOLOGY 3
Advanced topics in nanoscience and nanotechnology including nanostructures, nanomaterial synthesis, properties, characterizations, and applications. The emphasis will be to introduce students to the science of the building blocks of nanostructured materials, material behavior when they are assembled, technology for building nanoscale structures and features, nanomaterials for energy conversion and storage, and the technological implications of these nanomaterials and nanotechnologies.

MEEG 614 ANALYSIS OF AIRCRAFT STRUCTURES 3
Deals with analysis and design of flight structures and other light-weight structures. Loads, supports and reactions, constitute equations, and stress and deformation of components for flight vehicles are investigated. Overview of fatigue, vibration (flutter) and instability of structures are given.

MEEG 615 MECHANICAL PROPERTIES OF MATERIALS 3

MEEG 616 COMPOSITE MATERIALS STRUCTURES 3
Introduction to composite materials; anisotropic elasticity and laminate theory; plates and panels of composite materials; beams, columns and rods; composite material shell structures; energy methods; strength and failure theories; adhesive bonding and mechanical fastening; hygrothermal effects; stress analysis, buckling, vibrations and impact.

MEEG 617 COMPOSITE MATERIALS 3
Fiber and matrix materials, fiber-matrix interface, polymer, metal, ceramic and composite matrix composites, geometric aspects, elastic properties, laminate theory, strength of unidirectional composites, strength of laminates, durability, hybrid composites, flexible composites and textile structural composites.

MEEG 619 MECHANICAL BEHAVIOR OF MATERIALS AND STRUCTURES 3
Examines how material properties influence structural response and failure mechanisms under the influence of external loads. Includes plasticity; thermal stresses; fracture and damage mechanics; and buckling. Problem solving based on both analytical methods and computational mechanics. PREREQ: MEEG610 or permission of instructor.

MEEG 620 INTERMEDIATE DYNAMICS 3
Reference frames, angular velocity, linear velocity, angular acceleration, linear acceleration, multibody systems, inertia properties, kinetic energy, equations of motion, generalized d’Alembert’s principles, numerical integration, computer simulation.

MEEG 621 LINEAR SYSTEMS 3
State-space analysis of linear dynamical systems. Solution of state-space equations, and analysis of structural system properties based on eigenvalues and eigenvectors. Similarity transformations and decompositions. Lapunov stability. Observability and controllability. State feedback control design. May be crosslisted with ELEG621. PREREQ: MATH349 or MATH351 or graduate status.

MEEG 622 INTERFACE SCIENCE AND ENGINEERING 3
Materials tribology concerns the material’s response to sliding or tribological contact. Moving systems become immobile when tribological materials fail. This course provides an introduction to tribology, imparts a basic understanding of interfacial phenomena, and surveys emerging interface challenges in aerospace, wind power, and osteoarthritis applications.

MEEG 623 NONLINEAR DYNAMICS AND CHAOS 3
Nonlinear dynamics and chaotic phenomenon as applied to natural and engineering systems. Geometric and computational techniques, analytical methods for the qualitative analysis of dynamical systems modeled by differential equations and iterated maps. Planar and non-planar phase space analysis, local and global bifurcation analysis, catastrophes, resonances. PREREQ: MATH351 or graduate status.

MEEG 630 INTERMEDIATE FLUID MECHANICS 3
MEEG 635  WIND POWER ENGINEERING  3
Lecture course on engineering aspects of modern large wind turbines.

MEEG 637  MULTIPHASE FLOW AND TRANSPORT  3
Principles of multiphase flows with particles, droplets, and bubbles. Local and averaging formulations of interfacial mass, momentum, energy transfers and related transport processes. Applications to industrial and environmental processes.
PREREQ: MEEG630 or permission of instructor.

MEEG 638  COMPUTATIONAL MULTIPHASE FLOW  3
Overview of computational methods for multiphase flow involving moving solid boundaries and deformable fluid-fluid interfaces. Example codes to study physical and numerical issues such as numerical convergence, accuracy, and stability.
PREREQ: MEEG332 or MEEG630 or permission of instructor.

MEEG 639  COMPUTATIONAL MULTIPHASE FLOW  3
Overview of computational methods for multiphase flow involving moving solid boundaries and deformable fluid-fluid interfaces. Example codes to study physical and numerical issues such as numerical convergence, accuracy and stability.
PREREQ: MEEG331 or MEEG630.

MEEG 640  INTERMEDIATE HEAT TRANSFER  3
Theory and equations of heat conduction, boundary conditions, steady and transient heat conduction, theory of convection, forced convection in laminar flows, derivation of conservation equations, numerical methods.

MEEG 642  INTRODUCTION TO FUEL CELLS  3
Basic principles of fuel cells, fuel cell types and their applications, fuel processing and hydrogen storage.

MEEG 651  INTRODUCTION TO MICROSYSTEMS  3
This course examines the mechanical, thermal, optical, fluidic, chemical, and biological devices that can be derived using modern microfabrication methods. Topics include typical fabrication steps, device physics and mechanics, and a survey of existing and emerging device areas.
PREREQ: PHYS208 or PHYS245 or graduate standing.

MEEG 653  MANUFACTURING PROCESSES AND SYSTEMS  3
Explains key concepts and elements of basic processes (metal cutting, forming, plastic molding), technologies (robotics, ergonomics, material handling, quality management, machine vision), industries/systems (pharmaceutical, automotive, packaging, food, and current advances (lean mfg., just-in-time).
PREREQ: MEEG321 or graduate status.

MEEG 655  PRINCIPLES OF COMPOSITES MANUFACTURING  3
Fundamental principles involved in composites manufacturing are introduced. Modeling of such processes emphasized with applications of injection molding, compression molding, filament winding, pultrusion and resin transfer molding.
PREREQ: MEEG332 and MEEG342.

MEEG 671  INTRODUCTION TO ROBOTICS  3
Topics include: rigid motions and transformations, forward kinematics, Denavit-Hartenberg representations, inverse kinematics, velocity kinematics, dynamics, independent joint control, multivariable control, force control.
PREREQ: Requires familiarity with kinematics and basic dynamics. RESTRICTIONS: Recommended for seniors and graduate students.

MEEG 681  CYTOMECHANICS  3
Cell, the universal unit of life, behaves as a "mechanical living" entity. Besides sensing, "smell or taste" mediated by chemical reactions, cells also display a strong sense of "touch" mediated by mechanical interactions. Mechanics is involved in many fundamental processes such as cell shape, motility, and differentiation. In this course, the students will be exposed to the principles of cytomechanics and the fascinating cellular responses and adaptation to the mechanical environment.
PREREQ: BISC207 and MEEG215 or instructors approval.

MEEG 682  CLINICAL BIOMECHANICS  3
The biomechanics and patho-mechanics of various human musculoskeletal joint systems. Normal joint anatomy and biomechanics; the mechanical effects of pathology and the goals of surgical repairs to counteract them are explored through in vitro, in vivo and mathematical modeling studies of joint system mechanics.

MEEG 683  ORTHOPEDIC BIOMECHANICS  3
Anatomy and physiology including microanatomy and mechanics of bone, cartilage, tendon and muscle. Mechanical modeling of body including joint loads, motion analysis, muscle forces and interaction with orthopedic devices.
PREREQ: MEEG211 and MEEG215 or graduate standing.

MEEG 684  BIOMATERIALS AND TISSUE ENG APP  3
Biomaterials for mechanical replacement of Orthopaedic tissues: bone, cartilage, ligament, tendon and whole joint systems. Topics include normal tissue mechanics and biocompatibility, mechanical behavior, degradation and host response to biomaterials. Experimental methods to assess biomaterials along with design and manufacturing considerations for joint and tissue replacements.

MEEG 685  CONTROL OF HUMAN MOVEMENT  3
Examines current topics in biomechanics research relevant to control of human movement including anatomy of the neuro-musculo-skeletal system, experimental techniques for study of CNS organization, and coordination principles of simple and complex tasks.
PREREQ: PHYS201 or PHYS207 or graduate status.

MEEG 686  CELL AND TISSUE TRANSFER  3
Analysis of water, solute, gas, and heat exchange in microcirculation and relationship between structure and function. Transport in biological porous media examined and applied to arterial wall, bone, and cartilage. Active transport across membranes considered and applied to kidney and secretary organs. Introduction to transport across cell membrane and role of receptors in transport, cell adhesion, and intracellular signaling presented.

MEEG 690  INTERMEDIATE ENGINEERING MATHEMATICS  3

MEEG 811  SANDWICH STRUCTURES  3
Composite and isotopic sandwich structures are studied for stresses, deformations, buckling loads, natural frequencies and dynamic response under mechanical and environmental loads, involving honeycomb, solid, foam, web and truss core sandwich comprising beam, plate, ring and shell structures. Design and minimum weight optimization are treated.

MEEG 816  ADVANCED CONTINuum MECHANICS  3
A rigorous study of kinematics of finite deformation and the field equations of mechanics and thermodynamics of continua. Tensor analysis employed throughout.

MEEG 817  COMPOSITE MATERIALS  3
Introduction, thermoelastic behavior of laminated composites, statistical strength theories of continuous-fiber composites, short-fiber composites, hybrid composites, two-dimensional textile structural composites, three-dimensional textile structural composites, flexible composites, and nonlinear elastic finite deformation of flexible composites. May be crosslisted with MEEG817.
PREREQ: MEEG610.

MEEG 818  PLATES AND SHELLS IN AEROSPACE STRUCTURES I  3

MEEG 819  PLATES AND SHELLS IN AEROSPACE STRUCTURES II  3
General theory of thin shells from three-dimensional equations of elasticity; shells of revolution under axially symmetric loads; asymmetric loads; thermoelastic effects; general bending theory, membrane theory, extensional theory; Donnell equations; edge load solutions, orthotropic shells, laminated shells.

MEEG 821  ADVANCED DYNAMICS  3
General principles of spatial dynamics. Lagrangian and Hamiltonian methods. Application to engineering problems.

MEEG 829  APPLIED NONLINEAR CONTROL  3

MEEG 831  FLUID DYNAMICS  3
PREREQ: MATH630, MEEG600, or permission of instructor.
MEEG 833  MESOSCOPIC CFD METHOD  3
Introduction to lattice Boltzmann equation and its applications as a numerical approach to single and multiple-phase flows. Relationships between mesoscopic operation rules and macroscopic Navier-Stokes equations. Treatment of complex boundary conditions and multiscale fluid-fluid and fluid-particle interfaces. Examples of lattice-Boltzmann computer simulations. May be crosslisted with MAST833.

MEEG 837  MULTIPHASE FLOW AND TRANSPORT  3
Principles of multiphase flows with particles, droplets, and bubbles. Local and averaging formulations of interfacial mass, momentum, energy transfers and related transport processes. Applications to industrial and environmental processes. PREREQ: MEEG630 or permission of instructor.

MEEG 840  SPECIAL TOPICS IN CONTINUUM MECHANICS  3
Study of advanced principles of continuum mechanics in one or more special fields. Topics selected by instructor. Special subjects may include the general theory of constitutive equations, hyperelasticity, electroelasticity, hypoelasticity, simple and nonsimple fluids, and solutions of special problems in these areas.

MEEG 868  RESEARCH  1-9
Experimental investigation conducted for the purpose of contributing new useful data and theory in some field of mechanical engineering. Although supervised, investigation is independent in character to encourage development of initiative.

MEEG 874  DIFFERENTIALLY FLAT SYSTEMS  3
Nonlinear dynamic systems. Examples from robotics and physical processes, Linear time-invariant SISO and MIMO systems, Nonlinear time-invariant SISO and MIMO systems, Mobile robots and non-holonomic systems. Non differentially flat systems.

MEEG 881  ADVANCED MUSCULOSKELETAL BIOMECHANICS  3
Examines current topics in biomechanics research including musculoskeletal modeling, muscle physiology, anthropometric analysis, biomedical imaging techniques, neural control of movement and/or clinical biomechanics. PREREQ: MEEG612 and MEEG683.

MEEG 891  ADVANCED ENGINEERING MATHEMATICS  3
Integral transform and Green’s Function Solution of Partial Differential Equations, complex variables, variational calculus and introduction to perturbation methods. PREREQ: MEEG690.

MEEG 964  PRE-CANDIDATE 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.

MEEG 969  DOCTORAL DISSERTATION  1-12 PF

MANAGEMENT INFORMATION SYSTEMS

MISY 160  BUSINESS COMPUTING: TOOLS AND CONCEPTS  3
Introduction to computers: components and operations. Introduction to management information/decision support systems and the system development process. Emphasis on microcomputers and software packages used in business.

MISY 225  INTRODUCTION TO PROGRAMMING BUSINESS APPLICATIONS  3
Use of higher level contemporary computing languages to structure Prototyping applications of systems. PREREQ: MISY160 or CISCI101. RESTRICTIONS: Not open to CIS majors in the MIS minor.

MISY 261  BUSINESS INFORMATION SYSTEMS  3
Introduction to management information systems. Programming techniques for problem solving with business productivity tools and software. Emphasis on business applications. PREREQ: MISY160 or CISCI101.

MISY 262  FUNDAMENTALS OF BUSINESS ANALYTICS  3
Introduction to the basic tools and methods of data analytics for business. Topics include inferential statistics, predictive models, business processes, and methods of presenting results. Includes light programming. PREREQ: MATH201 or equivalent. RESTRICTIONS: Open to Lerner College of B&E majors only.

MISY 305  INFORMATION SECURITY AND RISK MANAGEMENT  3
Introduction to the management of information security and risk at both the personal and enterprise levels. Topics include viruses, hacking, cyber warfare, mobile security, social networking, denial-of-service, cloud computing, and risk assessment. May be crosslisted with ACCT305. PREREQ: MISY160. RESTRICTIONS: Not open to freshmen.

MISY 330  DATABASE DESIGN AND IMPLEMENTATION  3
Covers the design and implementation of enterprise databases in the business environment. A networked setting and its effect on database management will be emphasized. PREREQ: MISY160 or CISCI181. RESTRICTIONS: MIS majors and MIS and/or GET minors only. Not open to computer science majors in the MIS minor. Not open to students who double major in both accounting and management information systems.

MISY 340  EMERGING TECHNOLOGIES  3
Businesses need to learn how to leverage new technologies to be effective. Explores emerging technologies, both from a technical and a managerial perspective. Focus will be on using technology to improve business processes and solve business problems. PREREQ: MISY225 or CISCI181.

MISY 350  BUSINESS APPLICATION DEVELOPMENT II  3
Covers concepts related to client side development, including cascading style sheets and JavaScript. PREREQ: MISY225.

MISY 360  WEB DEVELOPMENT  3
Programming Concepts for creating data-driven, web-based applications, including object oriented programming, XML, and service-oriented architecture. PREREQ: MISY225 and MISY330.

MISY 364  MANAGEMENT INFORMATION SYSTEMS IN PRACTICE  3
Requires at least 120 hours of MIS-related assignments in an internship, verified by the hiring company. A term paper relating the real world duties and responsibilities of the internship to principles learned in traditional MIS classes is required. PREREQ: MISY330.

MISY 366  INDEPENDENT STUDY  1-6

MISY 370  LARGE IT PROJECTS: BUSINESS AND IT VIEW  3
Exposes students to challenges of large IT projects from two perspectives: the software development life cycle and the business modeling of IT projects. Students learn to model the value of IT, measure IT risk and how the software development life cycle operates. PREREQ: MISY300 and MISY330. RESTRICTIONS: Open only to MIS Majors and GET Minors in the Immersion Program.

MISY 375  GET IMMERSION EXPERIENCE INTERNSHIP  3
Fully supervised internship within a large and complex enterprise over an 8 month period of time. Documented project deliverables and learning outcomes. Students complete a learning contract with their on-site manager, participate in scheduled residencies with university faculty and review progress with a faculty advisor. PREREQ: MISY300 and MISY330. RESTRICTIONS: Open to MIS Majors and GET Minors Only.

MISY 380  ENTERPRISE RESOURCE PLANNING SYSTEMS  3
Focuses on large scale enterprise resource planning systems, their development, functionality, and implementation. Students configure a company on a live system. Delivery of ERP systems, such as hosted environments, is explored, as well as, business intelligence tools for analysis of enterprise data. PREREQ: MISY225 or MISY261. RESTRICTIONS: Open to MIS majors and minors, Information Systems majors and GET minors only.

MISY 385  INTEROPERABLE INFORMATION SYSTEMS  3
Focuses on the development of interoperable information systems. Coverage will include: syntactic interoperability (exchanging data), semantic interoperability (the interpretation of information), open source software, and standards such as XML. PREREQ: MISY225 or MISY261. RESTRICTIONS: Open to MIS majors and minors, Information Systems majors and GET minors only.

MISY 395  GLOBAL ISSUES IN INFORMATION TECHNOLOGY  3
Selected information technology topics facing global organizations are explored. Emphasis placed on enterprise systems and challenges of managing global systems. Company visits abroad deliver this perspective. RESTRICTIONS: Taught abroad.
MISY 420  GLOBAL IT ENABLED INNOVATION AND CHANGE  3
Student intern learns how to develop a strategic approach to technology innovation and change; understand organizational implications of innovation; present innovative ideas to senior management. Learn to understand the use of IT to solve a problem or create a competitive advantage.
PREREQ: MISY300 and MISY330. COREQ: MISY421. RESTRICTIONS: Open only to MIS Majors and GET Minors in the immersion program.

MISY 421  GLOBAL BUSINESS COMMUNICATIONS  3
Principles and practices for effective communication and collaboration in a global enterprise, includes formal presentations, conducting meetings, preparing written summaries and providing clear electronic messaging. Integrates theoretical foundations and practical guidance with real world experiences in communicating effectively in the global workplace.
PREREQ: MISY300 and MISY330. COREQ: MISY420. RESTRICTIONS: Open to MIS Majors and GET Minors Only.

MISY 427  MANAGEMENT OF INFORMATION SYSTEMS  3
Explores practical applications of information technology in all aspects of management including organizational behavior, human resource management, international management and strategic decision making. Issues of managing emerging technologies, integrating technologies with people, organizational culture and structure and strategic decision making will be discussed.
PREREQ: BUAD309. RESTRICTIONS: Open to management and MIS majors only.

MISY 430  SYSTEMS ANALYSIS AND IMPLEMENTATION  3
Covers the challenges of developing and managing systems analysis and design projects. Students learn to determine systems requirements, analyze systems problems, model potential solutions and design and implement these solutions. Other current topics will be included to reflect the changing information systems environment.
PREREQ: MISY330 or CISC437. RESTRICTIONS: Open to MIS majors and minors in ISY majors only.

MISY 431  MIS PROJECT MANAGEMENT  3
MISY431 and MISY432 serve as the MIS program capstone. Students learn project management techniques, and working in teams, apply this knowledge by developing technology-based business solutions for various enterprises.
PREREQ: MISY430 COREQ: MISY432 RESTRICTIONS: MIS Majors and Minors only.

MISY 432  MIS PROJECTS  3
MISY431 and MISY432 serve as the MIS program capstone. Students learn project techniques, and working in teams, apply this knowledge by developing technology-based business solutions for various organizations.
PREREQ: MISY430 COREQ: MISY431 RESTRICTIONS: Open to MIS Majors and Minors only.

MISY 465  INTRODUCTION TO CYBERSECURITY  3
This cybersecurity course is an introduction to computer and network security and covers the foundation security policies and methods to provide confidentiality, integrity, and availability, as well as cryptography, auditing, and user security. Topics are reinforced with hands-on exercises run in a virtual machine environment.
Crosslisted with CPEG465.

MISY 466  INDEPENDENT STUDY  1-6

MISY 631  DATA MINING FOR BUSINESS ANALYTICS  3
Introduces fundamental strategies and methodologies for data mining along with the concepts underlying them, and will provide hands-on experience with a variety of different techniques in a business setting. Students will learn to use data mining tools.
PREREQ: BUAD820.

MISY 665  INTRODUCTION TO CYBERSECURITY  3
Introduction to computer and network security and covers the foundation security policies and methods to provide confidentiality, integrity, and availability, as well as cryptography, auditing, and user security. Topics are reinforced with hands-on exercises run in a virtual machine environment.
Crosslisted with CPEG665.

MISY 810  TELECOMMUNICATIONS AND NETWORKING  3
Leadership skills in information technology, telecommunications and internet technology for technology management. Introduces concepts in data and image compression, digital audio and digital cellular telephony. Provides fundamental knowledge of transmission and storage technology and a system-level understanding of computer networks and the internet.

MISY 830  BUSINESS INTELLIGENCE AND ANALYTICS  3
Considers how to structure and define complex business decision problems; the analytical framework and techniques required to understand the problem; where the data needed for the analysis resides in the organization and the tools and techniques needed to obtain it.
RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management program.

MISY 831  ENTERPRISE INFORMATION SYSTEMS  3
Focus on the various technologies and implementation issues of enterprise information system (EIS). Students will learn the critical role of EIS in business organizations, the interplay between business processes and EIS, how to use and configure an EIS, and the best practices in managing an EIS. (Primary designation MISY; secondary designation FSAN.
May be crosslisted with FSAN381.

MISY 840  PROJECT MANAGEMENT AND COSTING  3
Provides the technical knowledge and skills needed to successfully plan, execute and evaluate IT projects. Strong emphasis on the costing of IT projects.
RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management program.

MISY 850  SECURITY AND CONTROL  3
Considers state-of-the-art technological and organizational approaches to enhancing the security and integrity of corporate information resources in a cost-effective manner.
RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management program.

MISY 865  SEMINAR  1-12
Taught from an IT perspective and provides a background for understanding the information needs of an organization’s business processes. Topics include accounting for an IT environment; business processes and operations management; finance; marketing; management; and programming.
RESTRICTIONS: Open only to students in the M.S. in Information Systems and Technology Management program.

MISY 870  HIGH TECHNOLOGY SEMINARS  2
Explores how information technologies to enhance the strategic goals of the organization. Examines the relationship between broad strategic goals and organizational mission, and specific tactical IT responses. Considers the strategic importance of ERP, CRM, corporate intelligence, knowledge sharing, etc.
RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management program.

MISY 871  MS IN IS&TM RESEARCH PROJECT  1
This course involves an independent research project under the supervision of an MIS faculty member chosen by the student.
RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management program.

MISY 873  INFORMATION TECHNOLOGY AND ORGANIZATIONAL EFFECTIVENESS  3
Examines how information and communication technologies combine with work processes and organizational structures to enhance organizational performance. Develops skills in recognizing opportunities for technology interventions and in effectively implementing technologically enhanced change.
PREREQ: BUAD870.

MILITARY SCIENCE

MLSC 105  INTRODUCTION TO LEADERSHIP I  1
Introduction to leadership principles using case studies, historical perspectives and hands-on leadership opportunities. Learn to rappel, use a map and compass, understand the basics of physical fitness and familiarize with Army traditions and ceremonies. No military obligation associated with this course.

MLSC 106  INTRODUCTION TO LEADERSHIP II  1
Continues to build on the basics of MLSC105. Provides additional leadership opportunities and expands upon leadership theory. Learn basic rifle marksmanship, develop public presentation abilities and continue physical fitness development. No military obligation associated with this course.

MLSC 205  BASIC LEADERSHIP I  1
Enhances understanding of human behavior, leadership techniques and management and planning structures. Builds leadership competencies through leadership opportunities with structured evaluations and feedback. Learn about the various branches and job opportunities in the Army. No military obligation associated with this course.
MLSC 206  BASIC LEADERSHIP II  1
Continues to build on the basics of MLSC205. Learn small unit tactics, how to handle up to ten people in stressful situations with feedback on performance. Further develop skills with map and compass, weapons safety and emergency first aid techniques for basic life saving. No military obligation associated with this course.

MLSC 215  LEADER DEVELOPMENT  4
An introductory six week off-campus, hands-on leadership education and assessment course. Real life individual and collective leadership challenges and opportunities. All expenses paid. Multiple scholarship opportunities.

RESTRICTIONS: Permission of instructor required.

MLSC 305  APPLIED LEADERSHIP I  2
Advanced training in military leadership. One of two courses designed to prepare cadets for the ROTC Advanced Camp/Nurse Summer Training Program. Focuses on leadership development through multiple, small unit leadership opportunities and counseling. Fine tunes skills learned in the previous two years of Military Science, ROTC Basic Camp or prior military service, especially marksmanship, land navigation, drill and ceremonies and physical fitness. Commitment to military service required.
PREREQ: Requires permission of instructor.

MLSC 306  APPLIED LEADERSHIP II  2
Continues to build on the MLSC305. Completes preparation for Advanced Camp/Nurse Summer Training Program and focuses on leadership at the platoon and company level. Small unit tactics and training are emphasized. Information is provided to help the student make wise decisions about military service options. Commitment to military service required.
PREREQ: MLSC305

MLSC 315  LEADER EVALUATION  4
An advanced six week off-campus, hands-on leadership education and assessment course. Real life individual and collective leadership challenges and opportunities. All expenses paid.
PREREQ: MLSC305 and MLSC306

RESTRICTIONS: Requires permission of instructor.

MLSC 365  MILITARY HISTORY STUDIES  3
Selected topics in American military history, current military trends and future military requirements.

MLSC 366  INDEPENDENT STUDY  1-3

MLSC 405  ADVANCED LEADERSHIP I  2
Prepares cadets for commissioning by refining professional skills and leadership ability. Students assigned leadership positions and function as commanders and staff officers in planning and executing cadet battalion activities. Focuses on technical skills needed to accomplish assigned missions and other topics which expand cadet knowledge of Army systems and procedures. Commitment to military service required.
PREREQ: MLSC306

MLSC 406  ADVANCED LEADERSHIP II  2
Builds on leadership skills from MLSC405 and helps complete the transition from cadet to Lieutenant. Cadets are assigned new leadership positions to broaden their leadership experience. Focuses on officer professional leadership subjects needed to manage a military career and personal affairs. Commitment to military service required.
PREREQ: MLSC306

MLSC 466  INDEPENDENT STUDY  1-3

MSEG 366  INDEPENDENT STUDY  1-6

MSEG 406  CORROSION AND PROTECTION  3
PREREQ: CHEM103 and CHEM104, CHEM107 and CHEM108, or equivalent, MSEG302 or consent of instructor. Physical chemistry helpful.

MSEG 410  EXPERIMENTAL MECHANICS OF COMPOSITE MATERIALS  3
Study of the micromechanical and thermomechanical response of composite materials. Execution and assessment of experiments conducted to investigate strength and stiffness characteristics of composite materials.

MSEG 420  CAREER SURVIVAL OUTSIDE THE UNIVERSITY  1
Provides mechanisms to overcome cultural barriers existing between university and industrial cultures. Topics include leadership vs. management, professional and cultural ethics, individual responsibility vs. teamwork, and networking and mentorship in accomplishing career goals. Includes guest speakers from local industries, technical writing and oral communication exercises.

MSEG 422  CHARACTERIZATION OF ELECTRONIC MAT AND DEV  3
Focus on the fundamentals and practical considerations of the myriad techniques which are used to characterize electronic materials. Explore the theoretical underpinnings of the techniques and discuss applicability and limitations. May be crosslisted with ELEG425.

MSEG 425  ENTREPRENEURSHIP AND RISK: MEETING THE CHALLENGES  3
Deals with critical financial, legal, scientific and engineering issues confronted during initial planning stages of high technology start-up enterprise. Range of speakers from finance, marketing, engineering, law and early- and late-stage start-up companies provide perspective on challenges of launching new business venture. Work in cross-disciplinary teams to develop R&D strategic and business plan for new high tech product offering.

MSEG 441  NANOMATERIALS AND THIN-FILM PROCESSES  3
Includes physical and chemical vapor deposition processes. Topics selected from vacuum science and technology, thin-film evaporation processes, discharges, plasmas, ion-surface interactions, chemical vapor deposition, laser ablation, substrate surfaces and thin-film Nucleation, Epitaxy, film structure, characterization of thin-films and nanostructures, etc.

MSEG 442  SEMICONDUCTORS FOR MICRO- AND NANO- TECHNOLOGY  3
Introduction to some main themes of physics of semiconductors, emphasizing unique properties at micro- and nanometer scale. Reviews basic properties of bulk semiconductors and discusses how these properties modify at the micro- and nano-meter scale. Applications-oriented. Select range of applications in electronics, photonics, biology, chemistry, and medicine discussed to illustrate range of utility of micro- and nano-structures.

RESTRICTIONS: Upper-class undergraduates (at 4xx level) and graduates (at 6xx level) in materials science and engineering, electrical engineering, and physics.

MSEG 443  ETHICS IN NANOSCIENCE  3
Investigates the societal, environmental, and ethical issues that come out of rapid advances in nanotechnology. The current status of nanotechnology and basic concepts and theories of ethics are presented and overlaid to critically reflect on the future of responsible technological development in this area.

MSEG 446  SENIOR RESEARCH  1-6
Research general areas of materials science and/or engineering under the direction of a member of the materials science faculty or other faculty in science or engineering subject to the approval of the materials science chair.

RESTRICTIONS: Open to seniors only. Science background required.

MSEG 455  NANOPHOTONICS: MATERIALS AND DEVICES  3
Explores materials and device theories for nanophotonics which deals with optical phenomena at length scales comparable or much smaller than the conventional diffraction limit. Topics include optical absorption/scattering processes in the nanoscale, resonant cavities, quantum emitters, plasmonics, and metamaterials.
PREREQ: Quantum Mechanics or Equivalent: MSEG608 or Equivalent.
MSEG 460 BIOMATERIALS AND TISSUE ENGINEERING 3
Explores the principles and methodologies of tissue engineering with polymeric biomaterials. Both biological and materials science concepts will be introduced. Specific topics include cell growth and differentiation, extracellular matrix composition and properties, polymerization methods, polymer characterization methods and mechanical properties, and drug delivery. RESTRICTIONS: Students are expected to have a basic knowledge of organic chemistry and biology prior to enrollment in this course.

MSEG 466 INDEPENDENT STUDY 1-6

MSEG 470 SOLAR ENERGY 3
Considers the basics of solar energy utilization. Emphasis on photovoltaic systems, including inorganic and organic based systems, as well as hybrid solar cells, followed by consideration of passive and active usage such as solar thermal power.

MSEG 602 STRUCTURE OF MATERIALS 3
Crystal structure analysis by X-ray and electron diffraction. Characterization of materials by optical microscopy, scanning and transmission electron microscopy, thermal analysis and spectroscopy. PREREQ: MSEG302

MSEG 605 NANOPHOTONICS: MATERIALS AND DEVICES 3
The course covers materials and device theories for nanophotonics which deals with optical phenomena at length scales comparable or much smaller than the conventional diffraction limit. Key topics of the course include optical absorption/scattering processes in the nanoscale, resonant cavities, quantum emitters, plasmonics, and metamaterials. PREREQ: MSEG 640 or equivalent.

MSEG 606 CORROSION AND PROTECTION 3
Degradation of structural materials through interaction with their environment. Electrochemical attack on alloys and its relation to metallurgical structure. Forms of corrosion including high temperature oxidation and biological effects. Corrosion monitoring and deterioration of polymers, concrete and advanced materials. Emphasis on materials selection and corrosion control methods. PREREQ: CHEM103 and CHEM104, or CHEM107 and CHEM108, or equivalent, MSEG302 or permission of instructor. Physical chemistry helpful.

MSEG 607 PHYSICAL PROPERTIES OF MATERIALS I 3
Basic models of electrical, magnetic optical and thermal properties of solid materials. Introduction to quantum physics to describe electronic structure of atoms, atomic bonds and crystals. Electronic, magnetic and optical effects in metals, semiconductors, ceramics, polymers and amorphous materials. Operation of basic electronic devices and semiconductor. PREREQ: MSEG302 and PHYS208

MSEG 608 STRUCTURE AND PROPERTIES OF MATERIALS I 3
Introduces general principles of material structure and properties, including chemical and physical bonding, crystal structure, lattices, energy levels, and materials synthesis and chemistry. Introduces the fundamental structure and properties of polymer, solid state and composite materials. Includes a significant laboratory component.

MSEG 609 STRUCTURE AND PROPERTIES OF MATERIALS II 3
Introduces mechanical, thermal, electrical, optical, magnetic and biological properties of materials. Considers polymer, solid-state, and composite materials and discusses engineering of material properties via structure, composition, and processing. PREREQ: MSEG608.

MSEG 610 EXPERIMENTAL MECHANICS OF COMPOSITE MATERIALS 3
Study of the micromechanical and thermomechanical response of composite materials. Execution and assessment of experiments conducted to investigate strength and stiffness characteristics of composite materials.

MSEG 615 MECHANICAL PROPERTIES OF MATERIALS 3

MSEG 616 CHEMISTRY AND PHYSICS OF SURFACES AND INTERFACES 3
Fundamental and engineering aspects of metal, semiconductor, and oxide surfaces; their structure and defects, characterization, electronic properties, adsorption and reaction kinetics and thermodynamics. Applications to catalysis, microelectronics, and environment sensitive behavior. Crosslisted with CHEG616. PREREQ: CHEG332 and CHEM444. RESTRICTIONS: Open to seniors and graduate students only.

MSEG 620 CAREER SURVIVAL OUTSIDE THE UNIVERSITY 1
Provides mechanisms to overcome cultural barriers existing between university and industrial cultures. Topics include leadership vs. management, professional and cultural ethics, individual responsibility vs. teamwork, and networking and mentorship in accomplishing career goals. Includes guest speakers from local industries, technical writing and oral communication exercises.

MSEG 622 CHARACTERIZATION OF ELECTRONIC MAT & DEV 3
Focus on the fundamentals and practical considerations of the myriad techniques which are used to characterize electronic materials. Explore the theoretical underpinnings of the techniques and discuss applicability and limitations. May be crosslisted with ELEG625.

MSEG 624 PRACTICAL ELECTRON MICROSCOPY 3
Basic theories and in-depth practical aspects of scanning electron microscopy, transmission electron microscopy, elemental analysis, and sample preparation techniques. Hands-on oriented. For some lab assignments, students can be accommodated to prepare and analyze real samples from their own research.

MSEG 625 ENTREPRENEURSHIP AND RISK: MEETING THE CHALLENGES 3
Deals with critical financial, legal, scientific and engineering issues confronted during initial planning stages of high technology start-up enterprise. Range of speakers from finance, marketing, engineering, law and early- and late-stage start-up companies provide perspective on challenges of launching new business venture. Work in cross-disciplinary teams to develop R&D strategic and business plan for new high tech product offering.

MSEG 630 INTRODUCTION TO SCIENCE AND ENGINEERING OF POLYMER SYSTEMS 3
Provides an understanding of the science and engineering of macromolecules from a structure To/property perspective. Topics include polymerization, chain structure and configuration, polymer size and shape, phase separation behavior, amorphous and crystalline state, glass-rubber transition, cross linking/rubber elasticity, viscoelasticity, rheology polymer processing and mechanical behavior. Crosslisted with CHEG600.

MSEG 640 APPLIED QUANTUM MECHANICS I 3
Focuses on the fundamentals of quantum mechanics, such as Schrödinger's equation, eigenfunctions and eigenvalues, operators, Dirac notation, quantum wells and tunneling, harmonic oscillators, perturbation theory and approximation methods, and the application of quantum mechanics in crystalline materials.

MSEG 641 NANOMATERIALS AND THIN FILM PROCESSES 3
Includes physical and chemical vapor deposition processes. Topics selected from Vacuum Science and Technology, Thin-Film Evaporation Processes, Discharges, Plasmas, Ion-Surface Interactions, Chemical Vapor Deposition, Laser Ablation, Substrate Surfaces and Thin-Film Nucleation, Epitaxy, Film Structure, Characterization of Thin Films and nanostructures, etc. Crosslisted with PHYS641.

MSEG 643 ETHICS IN NANOSCIENCE 3
This course investigates the social, environmental, and ethical issues that come out of rapid advances in nanotechnology. The current status of nanotechnology and basic concepts and theories of ethics are presented and overlaid to critically reflect on the future of responsible technological development in this area.

MSEG 650 TOPICS IN RENEWABLE ENERGY 3
Technical analyses of renewable energy systems, particularly solar and hydrogen. Determination of energy payback, application, and efficiency of energy systems, economics, and policy. Problem based learning, with students expected to complete several group project.

MSEG 655 NANOPHOTONICS: MATERIALS AND DEVICES 3
Explores materials and device theories for nanophotonics which deals with optical phenomena at length scales comparable or much smaller than the conventional diffraction limit. Topics include optical absorption/scattering processes in the nanoscale, resonant cavities, quantum emitters, plasmonics, and metamaterials. PREREQ: Quantum Mechanics or Equivalent: MSEG608 or Equivalent.

MSEG 660 BIOMATERIALS AND TISSUE ENGINEERING 3
This course covers the principles and methodologies of tissue engineering with polymeric biomaterials. Both biological and materials science concepts will be introduced. Specific topics include cell growth and differentiation, extracellular matrix composition and properties, polymerization methods, polymer characterization methods and mechanical properties, and drug delivery. RESTRICTIONS: Students are expected to have a basic knowledge of organic chemistry and biology prior to enrollment in this course.

MSEG 666 SPECIAL PROBLEM 1-12
MSST 464 MUSEUM STUDIES INTERNSHIP 3
Internship in collections management, exhibition, research, interpretation, education and public programming, administration or other service functions of museums, historic sites, archives or other related cultural organization. Placement must be approved by Museum Studies faculty. May include group placements for special projects.
PREREQ: MSST 203.

MSST 600 INTRODUCTION TO MUSEUMS: HISTORY AND PROFESSIONAL PRACTICE 3
Core course for the Museum Studies Certificate Program. Introduction to the history of museums and examines selected current issues in museum professional practice. Content may offer discussion of issues in collecting and exhibition practice, education and audience development, evolving professional ethics, and museum governance.
RESTRICTIONS: Open to graduate students only. Students who are not seeking the certificate in Museum Studies must have the instructor's permission to register.

MSST 601 CURATORSHIP AND COLLECTIONS MANAGEMENT 3
Theory and practice in curatorial collecting and collections management. Topics include the ethical framework and legal requirements of collecting by not-for-profit organizations; research techniques to support collecting and collection documentation; the legal requirements and best practices of collections administration; care and handling requirements; and decision making for conservation. Combines classroom instruction, demonstrations and field trips with "hands on" projects.
RESTRICTIONS: Open to graduate students only.

MSST 602 CURATORSHIP AND MANAGEMENT OF ARCHIVES AND PAPER COLLECTIONS 3 PF
An introduction to theory and best practices in collecting and management of archives and paper collections, including collecting, processing and access, and care. Combines classroom instruction, demonstrations and field trips with "hands on" projects.
RESTRICTIONS: Graduate Students Only.

MSST 603 MUSEUMS AND MODERN TECHNOLOGY 3
Examines the use of digital technology in museums. Topics include communication strategies, digital image processing, collections databases, geographic information systems, CAD, animation, exhibitions, and web design. Students will plan and prepare a web site that deals with a museum-related topic.
RESTRICTIONS: Open to graduate students only.

MSST 605 HISTORICAL PROPERTIES 3
Administration and interpretation of historical properties, including historic site surveys, preservation research, building restoration, conservation techniques and the establishment and attainment of interpretive objectives. Field trips to area historic sites. Combines classroom instruction and work projects at area historic sites.
RESTRICTIONS: Open to graduate students only.

MSST 606 ISSUES IN AMERICAN MATERIAL CULTURE 3
Studies major themes in American material culture of the 17th, 18th or 19th centuries. Topics vary. Crosslisted with EAMC606.
RESTRICTIONS: Requires permission of instructor.

MSST 607 MUSEUM EDUCATION AND INTERPRETATION 3
The theory, strategies, practices, evaluation and administration of learning in a museum environment with emphasis on interpretation of collections through a variety of instructional means. Lectures, discussions, field trips, program planning, curriculum development, proposal writing, audience studies, practice teaching and special project work with area museums.
RESTRICTIONS: Open to graduate students only.

MSST 610 EXHIBITIONS 3
Best practices in planning, scripting, designing, fabricating, and evaluating exhibitions in museums, libraries, and related venues.
RESTRICTIONS: Graduate students only. By permission of instructor.

MSST 629 HISTORIC PRESERVATION THEORY AND PRACTICE 3
Analysis of the theory underlying historic preservation in the United States and globally, including its history and evolution over time. Examines the impact of preservation laws and public policies, and the strategies and regulations for identifying significant structures, sites, and cultural heritage worthy of preservation. Crosslisted with UAPP 629.

MSST 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. Crosslisted with UAPP 654.

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

MSST 804 MUSEUM INTERNSHIP 3
Internship practice in administration, collections management, exhibition and interpretation at museums and related institutions. Students spend ten full weeks, or the equivalent, at the University museum, Winterthur Museum, Hagley Museum, Longwood Gardens or other acceptable institution. May be crosslisted with HIST 804. RESTRICTIONS: Open to graduate students only. Requires at least one semester course in museum studies and permission of instructor.

MUED 166 SPECIAL PROBLEM 1-3

MUED 178 CLASS GUITAR FOR EDUCATION 1
Basic strumming, improvisation, beginning solos, and classical techniques. Students will be required to develop a syllabus for teaching a one-semester guitar class for middle school.
PREREQ: MUSC 177 or permission of instructor based on musical background.
RESTRICTIONS: Open to education majors only, but not limited to music majors.

MUED 179 FRESHMAN SEMINAR IN MUSIC EDUCATION 1
Introduction to issues and approaches in music education. Helps students examine their own interests and aptitude for teaching while presenting discussion on current trends in the profession and attributes of successful teachers. Provides guidelines for developing student portfolios.
RESTRICTIONS: Open to music education majors. Offered fall semester only.

MUED 277 INTRODUCTION TO MUSIC EDUCATION 2
Intro. to instructional strategies, assessment, classroom management, dispositions, reflective practice, tonal/aural competencies, classroom vocal and keyboard skills, music national standards, trends in music education, philosophy of music education, music advocacy, and classroom music technology.
PREREQ: MUED 179. RESTRICTIONS: Open to Music Education Majors only.

MUED 279 ELEMENTARY GENERAL MUSIC METHODS AND MATERIALS 3
Introduction to developing Elementary General Music Methods and Materials and implementing a comprehensive, standards-based elementary general music curriculum through clinical experiences.
PREREQ: MUED 179 with a grade of C- or better. RESTRICTIONS: Restricted to music education majors.

MUED 336 CHORAL CONDUCTING 2
Specific problems in conducting choral literature. Comparative analysis of works to be conducted.
PREREQ: MUSC 335 with a grade of C- or better. RESTRICTIONS: For vocal music education majors. Offered spring semester only.

MUED 337 INSTRUMENTAL CONDUCTING 2
Specific problems in conducting instrumental literature. Practical application of conducting techniques through supervised conducting of instrumental ensembles.
PREREQ: MUSC 335. RESTRICTIONS: For instrumental music education majors. Offered spring semester only.

MUED 366 INDEPENDENT STUDY 1-3

MUED 377 ELEMENTARY GENERAL MUSIC METHODS 3
Elementary General Music Methods and Materials is an introduction to developing and implementing a comprehensive, standards-based, elementary general music curriculum through clinical experiences.
PREREQ: MUED 179 with a C- or better. RESTRICTIONS: Open to music education majors only. Successful passing of Music Education Sophomore Review.

MUED 378 SECONDARY GENERAL MUSIC METHODS AND MATERIALS 3
Introduction to developing and implementing a project-based curriculum for secondary general music through clinical experiences.
PREREQ: MUED 279 and MUSC 335 with a grade of C- or better. COREQ: MUED 336, MUSC 351, or MUSC 352. RESTRICTIONS: Restricted to music education majors. Students must successfully complete Praxis I Exam and Music Education Sophomore Review prior to enrollment.
MUED 379 MUSIC IN ELEMENTARY AND JUNIOR HIGH (OR MIDDLE) SCHOOL
3
Introduction to music materials and approaches through clinical experiences.
PREREQ: MUED 279 and MUS 351 with a grade of C- or better. COREQ: MUED 337, MUS 351, or MUS 352. RESTRICTIONS: Restricted to music education majors. Offered spring semester only. Students must successfully complete Praxis I Exam and Music Education Sophomore Review prior to enrollment.

MUED 390 MUSIC IN EARLY CHILDHOOD
3
Introduction to early childhood music materials and approaches through lecture and clinical experiences.
PREREQ: Must take prior to student teaching. RESTRICTIONS: For child development and early education education majors. Offered fall and spring semesters.

MUED 391 AESTHETICS AND EDUCATION
3
Exploration of the philosophical basis in the performing and visual arts in education and strategies for their integration into core curriculum subjects. Satisfies the Fine Arts requirement for Elementary Education majors.

MUED 478 SECONDARY MUSIC MATERIALS AND APPROACHES: CHORAL
3
Methods and materials for teaching choral/vocal music at the secondary level, including practical placements in the choral music education classroom. Topics include group vocal technique, rehearsal strategy and planning, and organization of the comprehensive choral program.
PREREQ: MUED 378 and MUED 336 with a grade of C- or better. For Music Education Majors only. RESTRICTIONS: Offered in Fall Semester only.

MUED 479 SECONDARY MUSIC MATERIALS AND APPROACHES
3
Procedures and materials used for teaching music in the secondary school.
PREREQ: MUED 379 and MUED 337 with a grade of C- or better. RESTRICTIONS: For music education majors. Offered fall semester only.

MUSIC

MUSC 100 RECITAL ATTENDANCE
0 PF
A recital experience; see Department of Music Student Handbook for details.
RESTRICTIONS: May be repeated. Open to music majors only. Offered in fall and spring semesters.

MUSC 101 APPRAISAL OF MUSIC
3
Introduction to Western music literature through a nontechnical presentation of various musical styles and forms.
RESTRICTIONS: Not open to music majors.

MUSC 102 APPRAISAL OF MUSIC
3
Music literature through a nontechnical presentation of various musical styles and forms. Continuation of MUSC101 with emphasis on the larger forms - symphonies, operas, oratorios, concertos - and the 20th century.
PREREQ: MUSC101 or permission of instructor.

MUSC 103 INTRODUCTION TO ITALIAN OPERA
3
Explores the world of opera including categories of singers; types of operas, e.g., opera seria and operas buffa; and the roles of the chorus. Includes experience seeing an opera performed live.

MUSC 104 INTRODUCTION TO OPERA
3
Introduction to opera, concentrating on opera comique, singspiel, operetta, baroque opera, seria, and Wagnerian music drama. Explores philosophies associated with music in the context of opera. Time span covered is 1607 to present.

MUSC 105 FUNDAMENTALS OF MUSIC
3
Introduction into the elements of music theory including ear training, music reading and harmony with keyboard application.
RESTRICTIONS: Designed for nonmusic majors.

MUSC 107 HISTORY OF ROCK
3
The study of various styles of rock music. Introduction to folk, country, blues, and jazz as predecessors to rock. Intended for the non-music major. No music reading skills required. May be crosslisted with BAMS 107.

MUSC 108 UNIVERSITY SINGERS
0-1
Members enter by audition. A chorus of sopranos and altos that performs its own concerts and may also perform with other choirs.
RESTRICTIONS: Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved ensemble during each semester of private study. May be repeated for credit. Offered

MUSC 109 SCHOLA CANTORUM
0-1
Members enter by audition. A chorus of 100+ voices that rehearses en masse on Monday nights and performs large-scale choral works. Smaller sections perform independently as well.
RESTRICTIONS: May be repeated for credit. Offered in fall and spring semesters. Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved ensemble during

MUSC 110 CHORALE
0-1
Members enter by audition. Chorale is the university's most select chorus of mixed voices.
RESTRICTIONS: May be repeated for credit. Offered in fall and spring semesters. Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved ensemble during

MUSC 111 CONCERT CHOIR
0-1
Select ensemble open to all students by permission of professor, as determined by audition. Rehearses and performs exemplary choral repertoire ranging from Renaissance to works by contemporary composers. Additional emphasis given to fostering healthy vocal production and development of sight singing skills.
PREREQ: Audition/permission of instructor. RESTRICTIONS: May be repeated for credit. Offered in fall and spring semesters. Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved ensemble during

MUSC 112 UNIVERSITY STRINGS
0-1
A music ensemble for string instrument players who are not in Symphony Orchestra. No audition required. One performance per semester. May be repeated for credit.
RESTRICTIONS: Students may enroll for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved ensemble during each semester of private study.

MUSC 113 MARCHING BAND
1
RESTRICTIONS: Contact the Director for detailed information. All interested percussionists, color guard and twirlers must audition. May be repeated for credit. Offered in fall semester only.

MUSC 114 SYMPHONIC BAND
0-1
Sixty-five to 70 member ensemble performs standard concert literature as well as new compositions.
RESTRICTIONS: Requires audition. May be repeated for credit. Offered in fall and spring semesters. Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved

MUSC 115 WIND ENSEMBLE
0-1
Select 45-member group of woodwind, brass and percussion players that performs original band music, chamber music and transcriptions.
RESTRICTIONS: May be repeated for credit. Offered in fall and spring semesters. Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved

MUSC 116 JAZZ ENSEMBLE
0-1
Study and performance of the diverse styles characteristic of the medium.
RESTRICTIONS:Requires audition. May be repeated for credit. Offered in fall and spring semesters. Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved

MUSC 117 SYMPHONY ORCHESTRA
0-1
Plays at least four public programs per year, drawn from music masterworks in all styles and periods from Baroque to Contemporary. Featured are faculty, professional soloists, conductors and collaborations with other University ensembles.
RESTRICTIONS: Requires audition. May be repeated for credit. Offered in fall and spring semesters. Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved

MUSC 118 PERCUSSION ENSEMBLE
0-1
Study and performance of works for percussion instruments.
RESTRICTIONS: Requires audition. May be repeated for credit. Offered in fall and spring semesters. Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved

MUSC 119 COLLEGIATE BAND
1
Collegiate Band is an ensemble designed for non-music majors and music majors playing secondary instruments to develop as musicians in a concert setting. Students will learn fundamental ensemble playing techniques through performance of standard and modern wind band literature.
RESTRICTIONS: May be repeated for up to eight credits.
MUSC 120  PEP BAND  0-1
Attends all home basketball games performing a variety of pop, rock and jazz selections. Performs at select games during Winter Session. Attendance at these games is mandatory.

RESTRICTIONS: Requires audition and may be repeated for credit. Offered in spring semester only. Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved course.

MUSC 123  STEEL BAND  0-1
Teaches music and theory through rote learning, reading, and improvisation to students with no musical training. Students perform in a traditional Caribbean Steel Drum Band.

RESTRICTIONS: Requires audition and may be repeated for credit. Offered in fall and spring semesters. Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved ensemble.

MUSC 124  STEEL BAND: ADVANCED ENSEMBLE  0-1
Traditional Caribbean Steel Drum ensemble. Students rehearse and perform music of the Caribbean tradition.

PREREQ: MUSC123 or permission of instructor. RESTRICTIONS: Permission of instructor students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved ensemble during each semester of private study. May be re

MUSC 125  COLLEGIUM MUSICUM  0-1
Ensemble for the performance of instrumental and vocal music of the Medieval, Renaissance and Early Baroque periods. Size, instrumentation and repertoire for the group varies from semester to semester dependent upon resources at hand, players’ skills and other factors.

PREREQ: Audition RESTRICTIONS: May be repeated for credit. Offered in fall and spring semesters. Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved ensemble during

MUSC 126  CHAMBER ORCHESTRA  0-1
A small, highly select group of orchestral musicians. The group performs one program of challenging, sophisticated music each semester both on and off campus. Audition required. May be repeated for credit.

RESTRICTIONS: Students may enroll for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved ensemble during each semester of private study.

MUSC 130  ALEXANDER TECHNIQUE  3
Providing an introduction to the Alexander Technique, a study of mindful, efficient, and freeing use of the body. Self-discoveries made in this course will benefit instrumentalists, vocalists, or dancers, and can serve as a guide for moving through your life in a healthy and graceful way.

RESTRICTIONS: May be repeated three times for credit.

MUSC 150  FRESHMAN HONORS PRIVATE STUDY  1
Private study for qualified freshman honors students. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class.

PREREQ: Requires audition. RESTRICTIONS: Restricted to freshman honors students only. May be repeated for credit. Offered in fall and spring semesters. Must be enrolled in a departmentally approved ensemble.

MUSC 151  PRIVATE STUDY FOR BACHELOR OF MUSIC I  2
Private study for freshmen bachelor of music students. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class.

PREREQ: Audition and acceptance into Bachelor of Music program. COREQ: One of MUSC108, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC321. RESTRICTIONS: For bachelor of music students only. Offered in fall and spring semesters.

MUSC 152  PRIVATE STUDY FOR BACHELOR OF MUSIC II  2
Continuing private study for freshman bachelor of music students. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class.

PREREQ:MUSC151 with a grade of C- or better. COREQ:One of MUSC108, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC321. RESTRICTIONS: or bachelor of music students only. Offered in fall and spring semesters.

MUSC 153  PRIVATE STUDY FOR BACHELOR OF ARTS AND MINORS I  2
Private study for bachelor of arts (music) students and music minors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class.

PREREQ: Audition and acceptance into bachelor of arts (Music) or music minor. COREQ: One of MUSC108, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For bachelor of arts (music) students and music minors only. Offered in fall and spring semesters.

MUSC 154  PRIVATE STUDY FOR MUSIC BACHELOR OF ARTS AND MINORS II  2
Continuing private study for bachelor of arts (music) students and music minors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class.

PREREQ: MUSC153 with a grade of C- or better. COREQ: One of MUSC108, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For bachelor of arts (music) students and music minors only. Offered in fall and spring semesters.

MUSC 155  PRIVATE STUDY FOR SECONDARY AND MERIT I  1
Private study for music majors pursuing a secondary area, and qualified students not enrolled in a music degree program. Student adds to course title the branch of study elected: piano, organ, voice, or orchestral instrument. Includes a one-hour studio class. May be repeated for credit.

COREQ: One of MUSC108, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: Requires audition and permission of instructor. Offered in fall and spring semesters.

MUSC 171  DICTIO: ENGLISH AND ITALIAN  1
Study of pronunciation rules for singing in English and Italian. Includes practicum.

RESTRICTIONS: Restricted to applied music/voice majors. Offered in fall semester only.

MUSC 174  CLASS VOICE: BEGINNING  1
Fundamentals of singing for nonvocal music major. Study of basic technique, repertoire and function of vocal mechanism.

PREREQ: Requires one semester of University vocal experience. RESTRICTIONS: Open to instrumental music education majors only. Offered in spring semester only.

MUSC 175  CLASS PIANO: ELEMENTARY I  1
Beginning piano primarily for the vocal or instrumental music major. Basic techniques, reading, transposition and playing by ear.

RESTRICTIONS: Preference for enrollment given to music majors and minors. Nonmusic majors require permission of instructor. Offered in fall semester only.

MUSC 176  CLASS PIANO: ELEMENTARY II  1
A continuation of MUSC175. Scale and arpeggio playing, keyboard harmony, repertoire of pieces appropriate to technical ability.

PREREQ: MUSC175 with grade of C- or better. RESTRICTIONS: Preference for enrollment given to music majors and minors. Nonmusic majors require permission of instructor. Offered in spring semester only.

MUSC 177  CLASS GUITAR I  1
Introduction to the fundamentals of guitar technique and note reading for nonmusic majors. Topics include guitar history, repertoire, scales and exercises with emphasis on classical as well as folk music. Music Education majors may also find this course particularly useful for classroom teaching.

RESTRICTIONS: Offered in fall and spring semesters.

MUSC 178  CLASS GUITAR II  1
A continuation of Class Guitar I with a stronger emphasis on ensemble playing and development of a repertoire.

PREREQ: MUSC177 with a grade of C- or better. RESTRICTIONS: Offered in spring semester only.

MUSC 179  ORGAN CLASS  1
Students learn the basic techniques needed to play the organ. Students apply these skills in a class setting, focusing on introductory organ literature and hymn playing.

RESTRICTIONS: Requires permission of instructor.

MUSC 181  PRIVATE STUDY FOR APPLIED JAZZ STYLES AND TECHNIQUES  2
Private studio instruction covering improvisational techniques and interpretation used in jazz performance. Examines a cross-section of styles and repertoire.

RESTRICTIONS: Requires audition and permission of instructor. Offered in fall and spring semesters.

MUSC 182  PRIVATE STUDY FOR APPLIED JAZZ STYLES AND TECHNIQUES  2
Private studio instruction covering improvisational techniques and interpretation used in jazz performance. Examines a cross-section of styles and repertoire.

PREREQ: MUSC181 with a grade of C- or better. RESTRICTIONS: Requires permission of instructor. Offered in spring and fall semesters.

MUSC 183  JAZZ IMPROVISATION  2
This course will develop skills for improvisation on standard jazz forms such as blues, rhythm changes, modal structures and other standard songs. Emphasis will be placed on the application of chord/scale relationships, transcription and analysis of jazz solos, and aural skills.

PREREQ: MUSC197 or permission of instructor.
MUSC 184  **FUNDAMENTALS OF MUSIC REVIEW**  
Build fundamental knowledge to enable success in the music theory sequence. Students cover pitch identification, scales, key signatures, rhythm and meter, intervals, and triads to achieve music literacy and fluency. Course is divided between online modules and problem sets assigned in class and for homework. Modules will be connected with a variety of musical styles, genres, and historical periods, including classical, jazz, and popular music. Students must earn passing score in each outcome to earn an overall passing grade. RESTRICTIONS: This is a remedial course and does not earn credit towards a degree.

MUSC 185  **AURAL SKILLS I**  
Techniques of sight singing and music reading skills. Development of ability in aural recognition of melody, harmony and rhythm.

RESTRICTIONS: Must take department music theory placement test. Offered in fall semester only.

MUSC 186  **AURAL SKILLS II**  
Techniques of sight singing and music reading skills. Development of ability in the aural recognition of melody, harmony and rhythm.

PREREQ: MUSC185 with grade of C- or better. COREQ: MUSC195. RESTRICTIONS: Open to music majors and minors. Offered in spring semester only.

MUSC 193  **SIGHT READING AT THE KEYBOARD I**  
Techniques for improving coordination and musical comprehension when playing from sight at the keyboard.

RESTRICTIONS: For keyboard majors. Offered in fall and spring semesters.

MUSC 194  **SIGHT READING AT THE KEYBOARD II**  
Continuation of MUSIC193.

PREREQ: MUSC193 with a grade of C- or better. RESTRICTIONS: For keyboard majors. Offered in fall and spring semesters.

MUSC 195  **HARMONY I**  

PREREQ: MUSC185 with grade of C- or better. COREQ: MUSC186. RESTRICTIONS: Must pass department Music Theory Placement Test or Theory Review Class. Offered spring only.

MUSC 196  **HARMONY II**  
Continuation of harmony: diatonic through chromatic harmony with keyboard application. Chord structures and functional relationships. Basic melodic and contrapuntal compositional techniques. Writing, playing and analysis.

PREREQ: MUSC186 and MUSC195 with grades of C- or better. COREQ: MUSC285. RESTRICTIONS: Open only to music majors and minors. Offered fall only.

MUSC 197  **JAZZ HARMONY**  
Study of elementary aspects of melody, harmony, texture, dynamics, rhythm and form in selected jazz and American popular literature; development of elementary aural-perceptual and compositional skills related to jazz and American popular music.

PREREQ: MUSC105 with a grade of C- or better. RESTRICTIONS: Offered in odd numbered years, fall semesters only.

MUSC 205  **MUSIC OF THE WORLD**  
Survey of non-Western world musical cultures utilizing textbook, reprinted reserve articles, films and in-class performance/demonstrations. Goal is the understanding and appreciation of various world music.

MUSC 206  **MUSIC OF CHINA, KOREA AND JAPAN**  
Systematically examines the origin and historical development of the musical cultures of the Far East. Studies how the musical and cultural influence of Chinese musical culture has had an enormous impact on the development of such cultures in Korea and Japan.

MUSC 207  **HISTORY OF JAZZ**  
Chronological study of the style changes in jazz from the late 19th century to the present. Emphasis on the sociological, economic and technological influences of the period and on the principal personalities who have been primarily responsible for change.

May be crosslisted with BAMS207. RESTRICTIONS: Offered in even numbered years, fall semester only.

MUSC 209  **HISTORY OF SPANISH MUSIC**  
Covers the most outstanding traditions of Spanish music, including Arab-influenced Andalusian music, 13th century music, schools of the “Renacimiento”, 17th century court music, the “Zarzuela”, 19th century Nationalism, and the most modern tendencies of the 20th century.

RESTRICTIONS: Taught abroad only.

MUSC 210  **MUSIC OF BRITAIN**  
Chronological study of music of Britain with emphasis on English music from 1485 to present. Explores music for various media (including choral, instrumental, opera) and principal British composers, relating the development of musical styles to events in British history. When taught as part of UD London Semester, will include attendance at variety of London performances.

RESTRICTIONS: Requires permission of instructor.

MUSC 211  **INTRODUCTION TO MUSIC HISTORY**  
Survey of selected works in music history with emphasis on selected basic terminology, forms and style changes, through score reading and listening.

PREREQ: MUSC125 and MUSC186 with a grade of C- or better. RESTRICTIONS: Offered in fall semester only.

MUSC 212  **HISTORY OF LITURGY AND HYMNS**  
Study of the evolution, structure and content of historical liturgies and of the hymnody which developed within them. Includes examination of Jewish and Eastern elements while focusing on the texts and music of the services and hymns of various traditions within the Western Church.

MUSC 213  **FRENCH MUSICAL CULTURE**  
Explores the contributions of French culture to the history of Western Music. Special focus on major trends in music written and performed in Paris from the Middle Ages through the 20th century, and on the musical institutions that made Paris a world capital of music.

RESTRICTIONS: Taught abroad only.

MUSC 214  **STRINGED INSTRUMENTS I**  
Development of pedagogy and performance skills.

RESTRICTIONS: Open only to music education and theory/composition majors.

MUSC 215  **BRASS INSTRUMENTS I**  
Development of pedagogy and performance skills.

RESTRICTIONS: Open only to music education and theory/composition majors.

MUSC 216  **BRASS INSTRUMENTS II**  
Advanced development of pedagogy and performance skills.

PREREQ: MUSC215 with a grade of C- or better. RESTRICTIONS: Offered only to music education and theory/composition majors.

MUSC 217  **WOODWIND INSTRUMENTS I**  
Development of pedagogy and performance skills.

RESTRICTIONS: Open only to music education and theory/composition majors.

MUSC 218  **WOODWIND INSTRUMENTS II**  
Advanced development of pedagogy and performance skills.

PREREQ: MUSC217 with a grade of C- or better. RESTRICTIONS: Offered only to music education and theory/composition majors.

MUSC 219  **PERCUSSION INSTRUMENTS**  
Development of pedagogy and performance skills.

RESTRICTIONS: Open only to music education and theory/composition majors.

MUSC 220  **MARCHING BAND TECHNIQUES**  
Focuses on designing and charting a show of the complete contemporary marching band. Overview of history and development of the marching band, as well as "hands-on" sessions in marching percussion and color guard.

PREREQ: MUSC113 with a grade of C- or better. RESTRICTIONS: Offered spring semester only.

MUSC 221  **MARCHING PERCUSSION TECHNIQUES**  
Focuses on advancing skills on the marching snare drum, multi-tenors, bass drum, cymbals or front ensemble. Emphasizes techniques through an opportunity to learn basic arranging skills. Open to students of all skill levels.

RESTRICTIONS: Offered spring semester only. May be repeated for credit.

MUSC 222  **STRINGED INSTRUMENTS II**  
Advanced development of pedagogy and performance skills.

PREREQ: MUSC214. RESTRICTIONS: Open only to music education and theory/composition majors.

MUSC 223  **STEEL BAND TRADITIONS AND PRACTICE**  
Teaches music and theory through rote learning, reading, and improvisation to students with no musical training. Students perform in a traditional Caribbean Steel Drum Band. In addition students make weekly visits to the "panyards" where the many steel bands of Trinidad and Tobago rehearse for the Panorama Competition.

RESTRICTIONS: Taught in Trinidad.
MUSC 224 **LONDON AND THE MOVIE SOUNDTRACK** 3
Examine the role music plays in film with a particular concentration on the scores recorded by the London Symphony Orchestra, London Philharmonic Orchestra, and the Philharmonia Orchestra. Includes a brief overview of the evolution of film music, an exploration of select composers and compositional style, as well as recording session techniques. We will visit the archives of these three orchestras, attend open rehearsals, performances, screen select films and hear from a variety of experts on music and film.
RESTRICTIONS: Winter session study abroad course.

MUSC 225 **JEWISH MUSIC** 3
Designed to present a study of the Jewish music as it has evolved from biblical era through the contemporary period. Encompass the numerous cultures and lands that the Jewish people have found themselves residing from Australia to America, Brazil to Bombay and many more. The course will look at the formal presentation of music in religious life, the creative presentation in social and religious life, and to the languages, styles, and cross-fertilization that happens when civilizations combine. From the synagogue to the street, the school room and bedroom, music is one lens through which we can understand Jewish life. Crosslisted with JWST225.

MUSC 226 **LONDON: CITY OF SYMPHONIES** 3
Examines the fertile arts environment in London that led to the development of one of the world’s greatest symphonic traditions. Dating back to the late eighteenth century and the rise of an established public concert series to the present day symphonic tradition, London boasts a diversity of orchestral opportunity that is unparalleled. After a brief examination of the historical roots, this class will focus on the contemporary orchestral music scene. We will visit the archives of major orchestras, attend open rehearsals, performances and hear from a variety of experts including musicians and administrators.
RESTRICTIONS: Winter session study abroad course.

MUSC 227 **POPULAR MUSIC OF THE GLOBAL SOUTH** 3
Introduces students to popular musical styles that connect the transatlantic diaspora and inform the diversity of music genres from the Global South; introduces music as a cultural device and an aspect of political and sociological struggles for democracy and a cultural space for racial integration.

MUSC 241 **ACCOMPANYING CHAMBER MUSIC: PIANO** 1
Accompanying vocalists and instrumentalists in the performance of chamber music with keyboard.
PREREQ: Sight-Reading Placement Test. RESTRICTIONS: Requires permission of instructor. Offered fall and spring semesters. May be taken 4 times for credit.

MUSC 251 **PRIVATE STUDY FOR BACHELOR OF MUSIC III** 2
Continuing private study for sophomore bachelor of music students. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class.
PREREQ: MUSC152 with a grade of C- or better. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For bachelor of music students only. Offered fall and spring semesters.

MUSC 252 **PRIVATE STUDY FOR BACHELOR OF MUSIC IV** 2
Continuing private study for sophomore bachelor of music students. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class. In lieu of a jury, the student performs a Sophomore Review which must be passed in order to continue on to junior-level private study (see student handbook for details).
PREREQ: MUSC251 with a grade of C- or better. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For bachelor of music students only. Offered fall and spring semesters.

MUSC 253 **PRIVATE STUDY FOR BACHELOR OF ARTS AND MINORS III** 2
Continuing private study for bachelor of arts (music) students and music minors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class.
PREREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For bachelor of arts (music) students and music minors only. Offered fall and spring semesters.

MUSC 254 **PRIVATE STUDY FOR MUSIC BACHELOR OF ARTS AND MINORS IV** 2
Continuing private study for bachelor of arts (music) students and music minors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class.
PREREQ: MUSC253 with a grade of C- or better. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For bachelor of arts (music) students and music minors only. Offered fall and spring semesters only.

MUSC 271 **DICTION: GERMAN** 1
A study of pronunciation rules for singing in German. Includes practicum.
PREREQ: MUSC171 with a grade of C- or better. COREQ: Enrollment in applied study. RESTRICTIONS: Offered fall semester only.

MUSC 272 **DICTION: FRENCH** 1
A study of pronunciation rules for singing in French. Includes practicum.
PREREQ: MUSC171 with a grade of C- or better. COREQ: Enrollment in applied study. RESTRICTIONS: Offered spring semester only.

MUSC 275 **CLASS PIANO: INTERMEDIATE I** 1
Piano techniques applicable to the levels and needs of the students; a continuation of reading and transposition; and improvisation and repertory of grade two pieces.
PREREQ: MUSC176 with grade of C- or better. RESTRICTIONS: Restricted to music majors and minors, or by permission of instructor. Offered fall semester only.

MUSC 276 **CLASS PIANO: INTERMEDIATE II** 1
A continuation of MUSC275.
PREREQ: MUSC275 with a grade of C- or better. RESTRICTIONS: Restricted to music majors and minors, or by permission of instructor. Offered spring semester only.

MUSC 279 **INTRODUCTION TO THE ORGAN** 2
Designed to provide information about the organ: its history, use and literature as well as tonal and mechanical aspects of its design.

MUSC 281 **PRIVATE STUDY FOR APPLIED JAZZ STYLES AND TECHNIQUES I** 2
Private studio instruction covering improvisational techniques and interpretation used in jazz performance. Examines a cross-section of styles and repertoire.
PREREQ: MUSC181 with a grade of C- or better. RESTRICTIONS: Requires permission of instructor. Offered fall and spring semesters.

MUSC 282 **PRIVATE STUDY FOR APPLIED JAZZ STYLES AND TECHNIQUES II** 2
Private studio instruction covering improvisational techniques and interpretations used in jazz performance. Examines a cross-section of styles and repertoire.
PREREQ: MUSC281 with a grade of C- or better. RESTRICTIONS: Requires audition. Offered fall and spring semesters.

MUSC 283 **PRIVATE STUDY FOR APPLIED JAZZ STYLES AND TECHNIQUES III** 2
Private studio instruction covering improvisational techniques and interpretations used in jazz performance. Examines a cross-section of styles and repertoire.
PREREQ: MUSC282 with grade of C- or better. RESTRICTIONS: Requires permission of instructor. Offered fall and spring semesters.

MUSC 285 **ADVANCED AURAL SKILLS I** 2
Continuation of MUSC185 and MUSC186.
PREREQ: MUSC186 and MUSC195 with grades of C- or better. COREQ: MUSC196. RESTRICTIONS: Open to music majors and minors, or by permission of instructor. Offered fall semester only.

MUSC 286 **ADVANCED AURAL SKILLS II** 2
Continuation of MUSC185, MUSC186 and MUSC285.
PREREQ: MUSC285 and MUSC196 with grades of C- or better. COREQ: MUSC295. RESTRICTIONS: Open to music majors and minors, or by permission of instructor. Offered spring semester only.

MUSC 287 **MUSIC TECHNOLOGY I** 3
Overview and experience with commercially-available music-related hardware and software. Hardware includes IBM and Macintosh microcomputers, electronic keyboards and tone generators incorporating Musical Instrument Digital Interface (MIDI), digital recording systems, CD-ROM and videodisc. Software includes sequencers, notation packages, interactive composers, educational programs and hypermedia applications.
PREREQ: MUSC105 or MUSC195 with a grade of C- or better.

MUSC 291 **PRACTICUM IN CHURCH MUSIC** 1
Introduces a variety of skills, techniques and information needed in the practice of church music. Students will learn to apply these skills through in-class experience with various instruments and resources.

MUSC 292 **ORGAN IMPROVISATION AND SERVICE PLAYING** 2
Students learn and apply skills used in improvising at the organ and playing for church services. Basic conducting component included.

MUSC 295 **ADVANCED HARMONY I** 3
PREREQ: MUSC285 and MUSC196 with grades of C- or better. COREQ: MUSC286. RESTRICTIONS: Open to music majors and minors, or by permission of instructor. Offered spring semester only.
MUSC 296 ADVANCED HARMONY II 2
Continuation of MUSC295. Study of late 19th and 20th century harmony, techniques and styles. Continuation of instrumentation. Original compositions. PREREQ: MUSC286 and MUSC295 with grades of C- or better. RESTRICTIONS: Open to music majors and minors, or by permission of instructor. Offered fall semester only.

MUSC 298 BEGINNING MUSIC COMPOSITION 1
Private study in beginning composition. Creative writing in vocal and instrumental media. RESTRICTIONS: Restricted to theory/composition majors. May be repeated for up to 4 credits. Offered fall and spring semesters.

MUSC 301 JUNIOR RECITAL 0
A 30-minute public recital. COREQ: MUSC351, MUSC352, MUSC357, MUSC358, MUSC451. RESTRICTIONS: Offered fall and spring semesters.

MUSC 302 WOMEN IN MUSIC: AN ALTERNATE SURVEY 3
Survey of women's contributions to Western art music traditions from 12th century to present day through the study of women as composers, performers, patrons, and as the subject of musical expression. Explores cultural systems that have alternately encouraged and suppressed women's creativity. May be crosslisted with WOMS302.

MUSC 310 CHURCHES AND CATHEDRALS OF LONDON 3
A study of ecclesiastical architecture of the 12th-20th centuries, noting structure, architectural style & historical role, as well as the way in which music, liturgy and the visual arts unfold within each building. RESTRICTIONS: Taught in London only.

MUSC 311 MUSIC HISTORY: 400 THROUGH 1600 3
The history of musical style and theory in the Middle Ages (5th through 14th centuries) and the Renaissance (15th and 16th centuries). PREREQ: MUSC211, MUSC285, and MUSC196 with a grade of C- or better or permission of instructor. RESTRICTIONS: Offered spring semester only.

MUSC 312 MUSIC HISTORY: 1600 THROUGH 1827 3
The history of musical style and theory during the Baroque period (1600-1750), and the Classic period through the death of Beethoven (1827). PREREQ: MUSC311, MUSC295, and MUSC286 with a grade of C- or better or permission of instructor. RESTRICTIONS: Offered fall semester only.

MUSC 313 MUSIC HISTORY: 1827 TO THE PRESENT 3
The Romantic era, Impressionism and the 20th century. Musical thought and style from 1827 to the present. PREREQ: MUSC312 and MUSC296 with a grade of C- or better or permission of instructor. RESTRICTIONS: Offered spring semester only.

MUSC 321 ENSEMBLE: INSTRUMENTAL, PIANO, OR VOCAL 0-1
Performance of chamber literature for instrument, piano or voice. RESTRICTIONS: May be repeated for credit. Offered fall and spring semesters. Students may sign up for 0-credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one departmentally approved ensemble during each semester.

MUSC 328 CHORAL LITERATURE 2
Study of style, structure and interpretations of representative choral works, including large and small works composed since 1500. PREREQ: MUSC211 with a grade of C- or better.

MUSC 334 INTRODUCTION TO CREATIVE SOUND DESIGN 3
Basic course in which students engage in creating audio-visual landscapes, video with soundtrack, and songwriting through the use of digital media and sound technology.

MUSC 335 BASIC CONDUCTING 2
The principles of conducting and score reading. PREREQ: MUSC186 and MUSC195 with grades of C- or better. RESTRICTIONS: Offered fall semester only.

MUSC 339 VIENNESE COMPOSERS 3
Selected Viennese composers including Mozart, Beethoven, Schubert and the Strauss. Emphasis on Viennese music. A combination of music history and music appreciation. RESTRICTIONS: Taught in Semester in Vienna program only.

MUSC 345 HISTORY OF THEATRE: AMERICAN MUSICAL THEATRE 3
Musical-dramatic forms of the 18th, 19th and 20th centuries in the United States and their impact on the modern musical theatre. Complete works read and compared to a series of criteria that are found in successful modern shows. Comparison of older and current works. May be crosslisted with THEA345. RESTRICTIONS: Offered fall semester only.

MUSC 351 PRIVATE STUDY FOR MUSIC EDUCATION V 2
Continuing private study for junior music education majors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class. PREREQ: MUSC252 with a grade of C- or better. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For music education majors only. Offered fall and spring semesters.

MUSC 352 PRIVATE STUDY FOR MUSIC EDUCATION VI 2
Continuing private study for junior music education majors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class. PREREQ: MUSC351 with a grade of C- or better. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For music education majors only. Offered fall and spring semesters.

MUSC 353 PRIVATE STUDY FOR BACHELOR OF ARTS AND MINORS VI 2
Continuing private study for bachelor of arts (music) students and music minors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class. PREREQ: MUSC254 with a grade of C- or better or permission of instructor. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For bachelor of arts (music) students and music minors only. Does not count for bachelor of arts degree credit. Offered fall and spring semesters.

MUSC 354 PRIVATE STUDY FOR MUSIC BACHELOR OF ARTS AND MINORS VI 2
Continuing private study for bachelor of arts (music) students and music minors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class. PREREQ: MUSC353 with a grade of C- or better or permission of instructor. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For bachelor of arts (music) students and music minors only. Does not count for bachelor of arts degree credit. Offered fall and spring semesters.

MUSC 357 PRIVATE STUDY FOR APPLIED MUSIC V 3
Continuing private study for junior applied music majors, including preparation for Junior Recital. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class. PREREQ: MUSC252 with a grade of C- or better. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For applied music majors only. Offered in fall and spring semesters.

MUSC 358 PRIVATE STUDY FOR APPLIED MUSIC VI 3
Continuing private study for junior applied music majors, including preparation for Junior Recital. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class. PREREQ: MUSC357 with a grade of C- or better. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For applied music majors only. Offered in fall and spring semesters.

MUSC 363 KEYBOARD LITERATURE 3
Style, structure and technical performance of keyboard music from the 17th century to the present. PREREQ: MUSC252 or MUSC254 with a grade of C- or better. RESTRICTION: Offered in even numbered years, fall semester only

MUSC 366 INDEPENDENT STUDY 1-3

MUSC 390 HONORS COLLOQUIUM 3

MUSC 392 CONTRAPUNTAL WRITING 2
Contrapuntal techniques with emphasis on 16th- and 18th-century styles and forms. PREREQ: MUSC295 with a grade of C- or better. RESTRICTIONS: Offered in fall semesters only.

MUSC 393 KEYBOARD HARMONY 2
Practical course for the development of facility in applying knowledge of harmony to the keyboard. Emphasis on figured basis, score reading and improvisation. PREREQ: MUSC276 and MUSC285 with grades of C- or better. RESTRICTIONS: Offered in spring semesters only.
MUSC 441 ACCOMPANYING CHAMBER MUSIC: PIANO 1-3
Accompanying vocalists and instrumentalists and experiences with piano, chamber and large ensembles, and degree recitals.
PREREQ: MUSC241. RESTRICTIONS: Requires permission of instructor. Offered fall and spring semesters. May be repeated 1 time for credit.

MUSC 451 PRIVATE STUDY FOR MUSIC EDUCATION VII 2
Continuing private study for senior music education majors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class.
PREREQ: MUSC352 with a grade of C- or better. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For music education majors only. Offered fall and spring semesters.

MUSC 452 PRIVATE STUDY FOR MUSIC EDUCATION VIII 2
Optional continuing private study for senior music education majors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class.
PREREQ: MUSC451 with a grade of C- or better. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For music education majors only. Offered fall and spring semesters.

MUSC 453 PRIVATE STUDY FOR BACHELOR OF ARTS AND MINORS VII 2
Continuing private study for bachelor of arts (music) students and music minors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class. 
PREREQ: MUSC354, with a grade of C- or better, or permission of instructor. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For bachelor of arts (music) students and music minors only. Does not count for bachelor of arts degree credit. Offered fall and spring semesters.

MUSC 454 PRIVATE STUDY FOR MUSIC BACHELOR OF ARTS AND MINORS VIII 2
Continuing private study for bachelor of arts (music) students and music minors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class. 
PREREQ: MUSC353 with a grade of C- or better, or permission of instructor. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For applied music majors only. Offered in fall and spring semesters.

MUSC 457 PRIVATE STUDY FOR APPLIED MUSIC VII 4
Continuing private study for senior applied music majors, including preparation for Senior Recital. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class. 
PREREQ: MUSC358 with a grade of C- or better. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For applied music majors only. Offered in fall and spring semesters.

MUSC 458 PRIVATE STUDY FOR APPLIED MUSIC VIII 4
Continuing private study for senior applied music majors, including preparation for Senior Recital. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class. 
PREREQ: MUSC457 with a grade of C- or better. COREQ: One of MUSC108, MUSC109, MUSC110, MUSC113, MUSC114, MUSC115, MUSC116, MUSC117, MUSC118, MUSC321. RESTRICTIONS: For applied music majors only. Offered in fall and spring semesters.

MUSC 464 INTERNSHIP 1-3
Field experience with nonprofit performing arts organizations or commercial music businesses relevant to the student's area of interest.
RESTRICTIONS: Open to music management studies majors and minors only. Offered in fall and spring semesters.

MUSC 466 INDEPENDENT STUDY 1-3

MUSC 480 VOCAL PEDAGOGY 3
Designed for those who plan to work with the singing voice. Includes vocal research, comparative pedagogy, observation of teaching and practical teaching experience.
RESTRICTIONS: Offered fall semester only.

MUSC 481 PEDAGOGY AND LITERATURE 3
The study of teaching methods and literature (music scores, books, and other media). Shows teaching skills needed at the secondary level and lower.
RESTRICTIONS: Requires permission of instructor.
MUSC 484 RECORDING TECHNIQUES 3
Covers three parameters: history of recording and recording technology; recording techniques with hands-on experiences; and aesthetics of recording and its impact on music through the 20th and 21st centuries.
PREREQ: MUSC105 or MUSC195. RESTRICTIONS: Enrollment by permission of instructor.

MUSC 485 PRINCIPLES OF MUSIC INDUSTRY PRACTICE 3
Offers an understanding of the fundamental workings of the music industry. Examines theory/practice of core principles, focusing on provisions of copyright law, standard agreements, and professional organization influences. Emphasis on framework for interaction among writers, artists, performers, publishers, record companies, producers.
RESTRICTIONS: Enrollment by permission of instructor.

MUSC 486 ELEMENTS OF MUSIC MANAGEMENT 3
Introduces principles involved in planning and management for performing arts organizations. Includes basic concepts of project development and implementation, production issues for public performances, communication skills and marketing techniques, utilization of new technologies, and aspects of resource planning and advocacy.
RESTRICTIONS: Open to juniors and seniors. Offered fall semester only.

MUSC 487 PATTERNS OF PATRONAGE 3
Examines the creation, performance and transmission of music within a broader context of the economic, political, social and technological environment. Emphasizes interdependency of musical activity and its patrons, including traditional functions of state, church, civic, mercantile, private; also contemporary interaction with public, private, and third sectors.
RESTRICTIONS: Open to juniors and seniors. Offered spring semester only.

MUSC 489 OPERA WORKSHOP 0-3
Dramatic and musical preparation of operatic roles through the production of opera scenes or chamber opera.
RESTRICTIONS: Admission by audition, with permission of private instructor. Offered fall and spring semesters. Students may sign up for credit only if they have reached the 17-credit limit. Music majors and minors must be enrolled for credit in at least one department.

MUSC 490 OPERA WORKSHOP 0-3
Participation and performance in University of Delaware Opera Theatre’s fall or spring Mainstage productions. Rehearsals will include musical preparation, musical coaching and staging. Additional outside rehearsals and coachings may be required and will vary based on repertoire choices.
PREREQ: Admission by audition, with permission of private instructor.
RESTRICTIONS: Auditions for Mainstage productions and casting decisions for the following year are made at the very end of the Spring semester, so those interested in participating are encouraged to contact UD Opera Theatre staff as early as possible. Offered fall and

MUSC 495 ANALYSIS AND INTERPRETATION 3
Structure of homophonic and polyphonic music representing different periods of musical history.
PREREQ: MUSC295 with a grade of C- or better.

MUSC 511 HISTORICAL FOUNDATIONS REVIEW 2 PF
Review of the history of Western music (c. CE 400-Present). Designed for students who do not pass the Graduate Music History Entrance Examination. Students must pass course before taking MUSC511.
RESTRICTIONS: Does not count toward credits for degree.

MUSC 561 NON-DEGREE PRIVATE STUDY 1-2
Continuing private study for all music majors. The student adds to the course title the branch of study elected: piano, organ, voice, or an orchestral instrument. Includes a one-hour studio class.
PREREQ: MUSC452, MUSC454, or MUSC458, and permission of instructor. COREQ: MUSC108, 109, 110, 113, 114, 115, 116, 117, 118. 321. RESTRICTIONS: Music education and applied music majors only. May be repeated for credit.

MUSC 571 GRADUATE DICTION REVIEW 1 PF
Review of International Phonetic Alphabet (IPA) and pronunciation rules for singing in English, Italian, German and French.

MUSC 595 THEORY FOUNDATIONS REVIEW 2 PF
Review of basic harmony and ear-training skills. Designed for students who do not pass the Graduate Music Theory Placement Exam. Students must pass course before taking MUSC605.

MUSC 600 MASTER’S PERFORMANCE IN CONDUCTING 2
Reflects the culmination of student performances as a conductor with one or more large ensembles in the Department of Music.
PREREQ: MUSC662 RESTRICTIONS: For students in the Master of Music degree, Performance Concentration (Conducting).

MUSC 601 MASTER’S RECITAL 1-3 PF
A sixty-minute public recital.

MUSC 602 ADVANCED KEYBOARD LITERATURE 3
An historical survey of selected keyboard works from various style periods, including structural analysis and performance implications.
RESTRICTIONS: Requires permission of instructor.

MUSC 603 CHAMBER MUSIC LITERATURE 3
Survey of chamber music literature from the 17th century to the present.
RESTRICTIONS: Requires permission of instructor. Offered in even numbered years, in spring semester only.

MUSC 605 SYMPHONIC LITERATURE 3
Historical and structural analysis of major symphonic works from the 18th century to the present.
RESTRICTIONS: Requires permission of instructor. Offered in odd numbered years, in spring semester only.

MUSC 606 WIND LITERATURE 3
History of the wind band and its music from the Renaissance to the present, with emphasis on the wind music from the 19th and 20th centuries for wind ensemble and concert band. Examines wind literature suitable for secondary school and college-level performing groups.
RESTRICTIONS: Requires permission of instructor.

MUSC 607 CONTEMPORARY MUSIC LITERATURE 3
Analysis of styles and techniques of contemporary composers beginning with compositions of the late 1950s.
RESTRICTIONS: Requires permission of instructor. Offered in fall semester only.

MUSC 608 VOCAL LITERATURE I: SONG 3
A survey of important literature for solo voice. Focus on German Lieder, French Art Song, and twentieth-century Art Song.

MUSC 609 CHORAL MUSIC LITERATURE I 2
Study of style, structure, and interpretation of representative choral works, with special emphasis upon analytical process while determining appropriate performance practices as related to primary sources. Studies in this section shall be illustrated through the development of sacred choral repertoire best exemplified by the Mass and the motet. Repertoire studied changes each semester offered.
RESTRICTIONS: Requires permission of instructor. May be repeated once for credit.

MUSC 610 CHORAL MUSIC LITERATURE II 2
Study of style, structure, and interpretation of representative choral works, with special emphasis on analytical process while determining appropriate performance practice as related to primary sources. Studies in this section shall be illustrated through the development of secular forms ranging from those derived out of early Italian opera and madrigal traditions to modern day part-songs and secular compositions. Repertoire studied changes each semester offered.
RESTRICTIONS: Requires permission of instructor. May be repeated once for credit.

MUSC 611 STUDIES IN MUSIC HISTORY 3
A study of the relationship of music to the socio-cultural background of each epoch and discussions of performance practice problems. Topic of study change with each time of offering.
RESTRICTIONS: Offered in spring semester only. May be repeated for credit.

MUSC 612 CHORAL MUSIC LITERATURE III 2
In depth study of three major choral works in an examination of musical architecture, compositional language, and performance decisions related to score preparation for rehearsal and performance. Repertoire studied changes each semester offered.
RESTRICTIONS: Requires permission of instructor. May be repeated once for credit.

MUSC 618 VOCAL LITERATURE II: OPERA 3
Study of the musical and dramatic content of operatic works and movements which comprise the standard international repertoire; it includes a survey of the genre’s historical development and extensive exposure to listening examples from the different movements.

MUSC 620 LARGE ENSEMBLE 1
Participation as a performer in a large ensemble.
RESTRICTIONS: Entry audition required.
MUSC 621  CHAMBER ENSEMBLE  1
Performance of chamber literature for winds, strings, piano or voice. Ensembles receive faculty coaching in addition to their regular rehearsals. Ensembles perform at least one public program per semester.
RESTRICTIONS: Entry audition required.

MUSC 622  MATERIALS AND METHODS OF RESEARCH  3
Examines the major materials used in research in the areas of music history, theory, performance and education, as well as the methods of conducting research in these fields.
RESTRICTIONS: Requires permission of instructor. Offered in fall semester only.

MUSC 624  MARCHING BAND LEADERSHIP STAFF  0-1
Marching band members apply/audition for leadership roles. (Auditions each spring semester.) During fall semester, topics include challenges in peer-to-peer teaching, time management, leadership hierarchy, and developing positive leadership skills. Practical field experience is gained as students engaged in peer-to-peer teaching during marching band rehearsals and events resulting in direct application of lecture materials.
RESTRICTIONS: Requires permission of instructor. Offered in fall semester.

MUSC 625  ARTISTIC INNOVATIONS I  2
Aimed at the emerging music professional, the course provides hands-on development of performance and educational projects while discussing the practical elements of career building: creating effective presentations, managing financial and legal issues, and broadening a career outlook in music beyond the traditionally defined performance and education categories.

MUSC 626  ARTISTIC INNOVATIONS II  2
Focuses primarily on Teaching Artistry. Students design interactive performances for school and concert settings that introduce audiences to key musical concepts. Discussion of issues related to effective arts advocacy and the role of musicians in society.
RESTRICTIONS: MUSC625 preferred, but not required for this course.

MUSC 631  ADVANCED ARRANGING  3
Advanced arranging for chamber, choral and orchestral ensembles, concert band and marching band percussion section.
PREREQ: MUSC296 RESTRICTIONS: Enrollment by permission of instructor.

MUSC 636  ADVANCED CHORAL CONDUCTING  1-3
Advanced conducting techniques for directors of choral performing groups.
RESTRICTIONS: Open to graduate students enrolled in the Masters in Music degree program.

MUSC 637  ADVANCED INSTRUMENTAL CONDUCTING  3
Advanced conducting techniques for directors of instrumental performing groups.
RESTRICTIONS: Requires permission of instructor.

MUSC 638  LARGE ENSEMBLE PRACTICUM  1
Participation in a large ensemble and seminar with ensemble director.
RESTRICTIONS: Requires permission of instructor.

MUSC 640  HISTORY AND PHILOSOPHY OF MUSIC EDUCATION  3
Topics include philosophical issues concerning the role of arts in education, intrinsic and extrinsic rationales for music in the schools, and arts advocacy at the local, state, and national levels. Also includes the history and philosophy of music education in the United States from the colonial period to the present.
RESTRICTIONS: Requires permission of instructor.

MUSC 641  ADVANCED SECONDARY PRIVATE STUDY: I  2
Advanced graduate-level private instruction in a secondary instrument or voice.
RESTRICTIONS: Open to graduate students enrolled in the Masters in Music degree program and requires permission of instructor. May be repeated one time for credit.

MUSC 642  ADVANCED SECONDARY PRIVATE STUDY: II  2
Advanced graduate-level private instruction in a secondary instrument or voice. Continuation of MUSC641.
PREREQ: MUSC641. RESTRICTIONS: Open to graduate students enrolled in the Masters in Music degree program and requires permission of instructor. May be repeated one time for credit.

MUSC 643  ADVANCED SECONDARY PRIVATE STUDY: III  2
Advanced graduate-level private instruction in a secondary instrument or voice. Continuation of MUSC642.
PREREQ: MUSC642. RESTRICTIONS: Open to graduate students enrolled in the Masters in Music degree program and requires permission of instructor. May be repeated one time for credit.

MUSC 644  ADVANCED SECONDARY PRIVATE STUDY: IV  2
Advanced graduate-level private instruction in a secondary instrument or voice. Continuation of MUSC643.
PREREQ: MUSC643. RESTRICTIONS: Open to graduate students enrolled in the Masters in Music degree program and requires permission of instructor. May be repeated one time for credit.

MUSC 651  ADVANCED PRIVATE STUDY: CONDUCTING I  2
Advanced instruction in conducting.
RESTRICTIONS: Open to graduate students enrolled in the Masters in Music degree program and requires permission of instructor.

MUSC 652  ADVANCED PRIVATE STUDY: CONDUCTING II  2
Advanced instruction in conducting. Continuation of MUSC651.
PREREQ: MUSC651. RESTRICTIONS: Open to graduate students enrolled in the Masters in Music degree program and requires permission of instructor.

MUSC 653  ADVANCED PRIVATE STUDY: CONDUCTING III  2
Advanced instruction in conducting. Continuation of MUSC652.
PREREQ: MUSC652. RESTRICTIONS: Open to graduate students enrolled in the Masters in Music degree program and requires permission of instructor.

MUSC 654  ADVANCED PRIVATE STUDY: CONDUCTING IV  2
Advanced instruction in conducting. Continuation of MUSC653.
PREREQ: MUSC653. RESTRICTIONS: Open to graduate students enrolled in the Masters in Music degree program and requires permission of instructor.

MUSC 661  ADVANCED PRIVATE STUDY: I  2
Advanced private study; instrumental or vocal.
RESTRICTIONS: Requires an audition. May be repeated once for credit.

MUSC 662  ADVANCED PRIVATE STUDY: II  2
Advanced private study; instrumental or vocal.
PREREQ: MUSC661. RESTRICTIONS: Requires permission of instructor. May be repeated once for credit.

MUSC 663  ADVANCED PRIVATE STUDY: III  2
Advanced private study; instrumental or vocal.
PREREQ: MUSC662. RESTRICTIONS: Requires permission of instructor. May be repeated once for credit.

MUSC 664  ADVANCED PRIVATE STUDY: IV  2
Advanced private study; instrumental or vocal.
PREREQ: MUSC663. RESTRICTIONS: Requires permission of instructor. May be repeated once for credit.

MUSC 665  ADVANCED PRIVATE STUDY: COMPOSITION I  2
Advanced instruction in composition.
RESTRICTIONS: Open to graduate students enrolled in the Masters in Music degree program.

MUSC 667  ADVANCED PRIVATE STUDY: COMPOSITION II  2
Advanced instruction in composition. Continuation of MUSC671.
PREREQ: MUSC671. RESTRICTIONS: Requires permission of instructor.

MUSC 668  ADVANCED PRIVATE STUDY: COMPOSITION III  2
Advanced instruction in composition. Continuation of MUSC672.
PREREQ: MUSC672. RESTRICTIONS: Requires permission of instructor.

MUSC 669  ADVANCED PRIVATE STUDY: COMPOSITION IV  2
Advanced instruction in composition. Continuation of MUSC673.
PREREQ: MUSC673. RESTRICTIONS: Requires permission of instructor.

MUSC 675  ADVANCED GENERAL MUSIC PREK-12  3
Advanced methods in PreK-12 General Music.
RESTRICTIONS: Open to graduate students enrolled in the Masters in Music degree program.

MUSC 676  SEMINAR IN MUSIC EDUCATION  3
Advanced topics in music education.
RESTRICTIONS: Requires permission of instructor.

MUSC 677  SEMINAR IN MUSIC EDUCATION II  3
A continuation of advanced topics in music education (MUSC676).
RESTRICTIONS: Open to Master’s in Music students only.

MUSC 679  PROFESSIONAL DEVELOPMENT PROJECT I  3
Development of a portfolio to include unit plans based on synthesis of content from prior courses.
RESTRICTIONS: Requires permission of instructor. Taken in sequence with MUSC680 as an alternative to thesis option.

MUSC 680  PROFESSIONAL DEVELOPMENT PROJECT II  3
Implementation of the portfolio developed in MUSC679.
PREREQ: MUSC679. RESTRICTIONS: Taken in sequence with MUSC679 as an alternative to thesis option.
MUSC 681 PEDAGOGY AND LITERATURE 3
The study of teaching methods and literature (music scores, books and other media). Shows teaching skills needed at the university level and lower.

MUSC 684 ADVANCED RECORDING TECHNOQUES 3
Covers advanced aspects of the following parameters: history of recording and recording technology; recording techniques with hands-on experiences; and aesthetics of recording and its impact on music through the 20th and 21st centuries.
PREREQ: MUSC105 RESTRICTIONS: Enrollment by permission of instructor.

MUSC 688 ADVANCED PRINCIPLES OF MUSIC INDUSTRY PRACTICE 3
Offers an advanced understanding of the fundamental workings of the music industry. Emphasis on the advanced aspects of the theory/practice of core principles, with a focus on provisions of copyright law, standard agreements, professional organization influences, and the framework for interaction among writers, artists, performers, publishers, record companies, and producers.
RESTRICTIONS: Enrollment is by permission of instructor.

MUSC 695 ADVANCED ANALYSIS AND INTERPRETATION 3
Examination of structural, melodic, rhythmic, harmonic and textural aspects of selected music literature and their significance in artistic performance.
RESTRICTIONS: Requires satisfactory score on music theory graduate placement exam. Offered in fall semester only.

MUSC 697 ADVANCED JAZZ HARMONY 3
Study of advanced aspects of melody, harmony, texture, dynamics, rhythm and form in selected jazz and American popular literature; development of advanced aural-perceptual and compositional skills related to jazz and American popular music.
RESTRICTIONS: Enrollment by permission of instructor.

MUSC 865 CAPSTONE PROPOSAL 2
Designed to assist students with developing proposals for the Master's thesis or Professional Development Project.
RESTRICTIONS: Open to Master's in Music students only.

MUSC 866 SPECIAL PROBLEM 1-3

MUSC 869 MASTER'S THESIS 1-6

NEUROSCIENCE

NSCI 100 PSYCHOLOGICAL AND BRAIN SCIENCES 3
Covers topics studied by both psychologists and neuroscientists: biological bases of behavior, cognitive, developmental, and social psychology, and psychopathology. Recommended for neuroscience majors.

NSCI 320 INTRODUCTION TO NEUROSCIENCE 3
Survey of the basic sciences of the brain in relation to behavioral phenomena, including perception, memory, fear and aggression, and several mental disorders. May be crosslisted with PSYC320. PREREQ: C- or better in PSYC100 or NSCI100.

NSCI 368 RESEARCH 1-6
Participation in research program of a faculty member, and in a weekly seminar with students from other labs focusing on research methodology and other topics.
PREREQ: NSCI320 or PSYC320.

NSCI 414 DRUGS AND THE BRAIN 3
Topics covered include drug treatment of mental illness, and drug abuse/addiction. Crosslisted with PSYC414. PREREQ: PSYC209.

NSCI 426 ADVANCED NEUROANATOMY 3
Covers the functional organization of the nervous system with emphasis on the brain stem, cranial nerves, limbic system, and cerebral cortex. Surveys basic etiology, signs and symptoms of injury to spinal pathways, sensory-motor systems, methods of neurologic testing, and the Mental Status Exam.

NSCI 427 ADVANCED NEUROPHYSIOLOGY 3
Study of the physiology of the central nervous system, with an emphasis on the cellular and molecular basis of signal transmission in the brain.
PREREQ: NSCI320.

NSCI 428 ADVANCED NEUROPHARMACOLOGY 3
Examines the actions of psychoactive drugs on neurons, neural circuits, and behavior. Focus is on drugs used in mental health, neurological disorders, and drug abuse.
PREREQ: NSCI320. RESTRICTIONS: Restricted to NSCI majors and minors. Not open to students with PSYC/NSCI414 credit.

NSCI 429 INTEGRATIVE NEUROSCIENCE I 3
Examines current views on various systems of the brain with the functions they support.
PREREQ: NSCI320. RESTRICTIONS: Restricted to NSCI majors and minors.

NSCI 430 INTEGRATIVE NEUROSCIENCE II 3
Surveys topics in behavioral neuroscience, including nervous system development, and brain systems underlying arousal, emotion, physiological regulation, and cognitive functioning.
PREREQ: NSCI320. RESTRICTIONS: Restricted to NSCI majors and minors.

NSCI 431 STRESS AND THE BRAIN 3
Surveys clinical and experimental research to understand the impact of stress and experience on brain development, brain function, and behavior.
PREREQ: NSCI320.

NSCI 433 COGNITIVE NEUROSCIENCE 3
Examines brain mechanisms responsible for cognitive functions such as perception, memory, and language. Surveys methods for relating mind and brain, including brain-damaged patients, and brain imaging techniques. Crosslisted with PSYC433. PREREQ: PSYC209.

NSCI 435 HORMONES AND BEHAVIOR 3
Examines how hormones produce changes in behavior over the life course. Topics include mating and parental behavior, aggression, stress and depression, and learning and memory.
PREREQ: NSCI320. RESTRICTIONS: NSCI majors or minors.

NSCI 436 NATURE VS NURTURE 3
Examines the contribution of biological and environmental determinants to individual differences in behavior and disease.
PREREQ: NSCI320. RESTRICTIONS: Open to NSCI majors and minors only.

NSCI 438 CLINICAL NEUROSCIENCE 3
Examines the effects of localized brain trauma on cognitive, personality, and psychosocial functioning. Focuses on neuropsychological assessment, intervention, and common neuropathological syndromes.
PREREQ: NSCI320. RESTRICTIONS: Open to NSCI majors and minors.

NSCI 442 SOCIAL NEUROSCIENCE 3
Examines how neuroscience methods can help in understanding basic and complex social processes, and how social psychological methods help reveal hierarchical brain functions.
PREREQ: NSCI320. RESTRICTIONS: Restricted to NSCI majors and minors.

NSCI 468 ADVANCED RESEARCH 3
Participation in research program of a faculty member. Expected to contribute to conceptualization of research problems, design, and methodological discussions.
PREREQ: NSCI368. RESTRICTIONS: Open to NSCI majors and minors only.

NSCI 626 ADVANCED NEUROANATOMY 3
Covers the functional organization of the nervous system from a clinical perspective, with emphasis on the brain stem, cranial nerves, limbic system, and cerebral cortex. Also surveys basic etiology, signs and symptoms of injury to spinal pathways, sensory-motor systems, methods of neurologic testing, and the Mental Status Exam. May be crosslisted with BISC626, PSYC626.

NSCI 627 ADVANCED NEUROPHYSIOLOGY 3
Study of the physiology of the central nervous system, with an emphasis on the cellular and molecular basis of signal transmission in the brain. Crosslisted with BISC627.

NSCI 628 ADVANCED NEUROPHARMACOLOGY 3
Examines the actions of psychoactive drugs on neurons, neural circuits, and behavior. Focus is on drugs used in mental health, neurological disorders, and drug abuse. May be crosslisted with PSYC628.

NSCI 629 INTEGRATED NEUROSCIENCE I 3
The course integrates current views on various systems of the brain with the functions they support.

NSCI 630 INTEGRATIVE NEUROSCIENCE II 3
Surveys topics in behavioral neuroscience, including nervous system development, and brain systems underlying arousal, emotion, physiological regulation, and cognitive functioning.

NSCI 631 CURRENT TOPICS IN NEUROSCIENCE 3-12
In depth discussions of current research in a specific field of neuroscience.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSCI 632</td>
<td><strong>DEVELOPMENTAL BEHAVIORAL NEUROSCIENCE</strong></td>
<td>3</td>
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<tr>
<td></td>
<td>The aim is to understand behavioral development from a biological and comparative perspective. Course surveys development of sensory, motor, motivational, and cognitive processes.</td>
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<tr>
<td>NSCI 633</td>
<td><strong>NEUROPLASTICITY</strong></td>
<td>3</td>
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<tr>
<td></td>
<td>This course focuses on neuroplasticity and requires some prior knowledge of neuroanatomy and physiology. Topics include effects of experience on neurogenesis, stress effects, and synaptic remodeling.</td>
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<tr>
<td>NSCI 634</td>
<td><strong>STRESS AND THE BRAIN</strong></td>
<td>3</td>
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<tr>
<td></td>
<td>Course surveys clinical and experimental research on the impact of stress and experience on brain development, brain function, and behavior.</td>
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<tr>
<td>NSCI 635</td>
<td><strong>NEUROPLASTICITY</strong></td>
<td>3</td>
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<tr>
<td></td>
<td>Focuses on changes in the structure and function of the brain as a function of experience. Topics include neurogenesis, neuromediators, stress, protein synthesis, and synaptic remodeling.</td>
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<tr>
<td>NSCI 636</td>
<td><strong>SPATIAL COGNITION</strong></td>
<td>3</td>
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<td>Focuse on brain mechanisms that enable acquisition of information about the environment and the use of that information in spatial navigation for both animals and humans.</td>
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<tr>
<td>NSCI 637</td>
<td><strong>BEHAVIORAL EPIGENETICS</strong></td>
<td>3</td>
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<td>Provides an overview of the field of behavioral epigenetics, focusing on landmark and current studies in human and animal models. Examines multi-generational trajectories and clinical implications.</td>
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<tr>
<td>NSCI 638</td>
<td><strong>CLINICAL NEUROPSYCHOLOGY</strong></td>
<td>3</td>
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<tr>
<td></td>
<td>Examines the effects of localized brain trauma on cognitive, personality, and psychosocial functioning. Focuses on neuropsychological assessment, intervention, and common neuropathological syndromes.</td>
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<tr>
<td>NSCI 639</td>
<td><strong>THE EMOTIONAL BRAIN</strong></td>
<td>3</td>
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<td>The last 20 years has seen an explosion of research on the role of the brain in emotions. Examines the neuroscience of normal emotions and pathology of emotions in animals and humans.</td>
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<tr>
<td>NSCI 640</td>
<td><strong>THE IMMUNE SYSTEM AND BEHAVIOR</strong></td>
<td>3</td>
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<td>Examines the interaction of the brain and the immune system. Topics include mood alteration, motivation, and cognition, and relations to addiction, psychopathology, and learning disorders.</td>
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<tr>
<td>NSCI 641</td>
<td><strong>HORMONES AND BEHAVIOR</strong></td>
<td>3</td>
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<td></td>
<td>Examines how hormones produce changes in behavior over the life course. The focus includes sexual differentiation of the brain, mating and parental behavior, aggression, stress and depression, immune function, and learning and memory.</td>
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<tr>
<td>NSCI 642</td>
<td><strong>SOCIAL NEUROSCIENCE</strong></td>
<td>3</td>
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<td></td>
<td>Examines how neuroscience methods can help in understanding basic and complex social processes, and how social psychological methods help reveal hierarchical brain functions.</td>
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<tr>
<td>NSCI 643</td>
<td><strong>BODY AND SPACE</strong></td>
<td>3</td>
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<td>Our bodies are our gateway to the world. Examines theories about body perception, space representation, and sense of self. Topics include phantom limbs, tool use, motor control, intention, and pain.</td>
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<tr>
<td>NSCI 866</td>
<td><strong>NEUROSCIENCE COLLOQUIUM</strong></td>
<td>1 PF</td>
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<tr>
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<td>The Neuroscience colloquia and brown bag seminars feature faculty, student, and guest presentation of recent research. RESTRICTIONS: Open to graduate students only.</td>
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<tr>
<td>NSCI 868</td>
<td><strong>GRADUATE RESEARCH</strong></td>
<td>1-6 PF</td>
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<tr>
<td></td>
<td>Laboratory research.</td>
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<tr>
<td>NSCI 869</td>
<td><strong>MASTER'S THESIS</strong></td>
<td>1-6</td>
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<tr>
<td></td>
<td>Master's Thesis research.</td>
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<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NTDT 103</td>
<td><strong>INTRODUCTION TO NUTRITION PROFESSIONS</strong></td>
<td>1</td>
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<tr>
<td></td>
<td>Career opportunities in dietetics and nutrition. Provides information about undergraduate programs and the competencies required of dietitians and nutritional scientists. Introduces opportunities for undergraduate research. Introduction to concepts of a profession and relevant professional organizations. RESTRICTIONS: Open to APN, NS, and DIET majors only.</td>
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<tr>
<td>NTDT 105</td>
<td><strong>NUTRITION FOR SPORT</strong></td>
<td>3</td>
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<td></td>
<td>Nutrition for optimizing health and performance among student athletes, including appropriate selection and timing of foods, fluids, and supplements to accommodate sport-specific nutrient needs and body weight/body composition goals. Students will not receive credit if they have already taken NTDT200. RESTRICTIONS: May not be taken by students who have previously taken NTDT200.</td>
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<tr>
<td>NTDT 166</td>
<td><strong>SPECIAL PROBLEM</strong></td>
<td>1-12 PF</td>
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<tr>
<td></td>
<td>Freshman level independent study.</td>
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<tr>
<td>NTDT 168</td>
<td><strong>FRESHMAN SPECIAL TOPICS</strong></td>
<td>1-6</td>
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<tr>
<td></td>
<td>Freshman level independent study.</td>
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<tr>
<td>NTDT 200</td>
<td><strong>NUTRITION CONCEPTS</strong></td>
<td>3</td>
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<tr>
<td></td>
<td>Functions and sources of nutrients, dietary adequacy, energy balance and metabolism with emphasis on health promotion. Includes weight control, evaluation of popular diets, vegetarianism, eating disorders, alcohol, other current issues and concerns in nutrition.</td>
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<tr>
<td>NTDT 201</td>
<td><strong>FOOD CONCEPTS</strong></td>
<td>3</td>
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<td></td>
<td>Food selection and preparation as related to chemical and physical properties of food. Includes composition and structure of foods, functions of ingredients and methods to achieve desirable sensory and nutritional attributes of foods. RESTRICTIONS: Open to APN, DIET, and NS majors and minors only.</td>
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<tr>
<td>NTDT 250</td>
<td><strong>INTRODUCTION TO THE NUTRITION CARE PROCESS</strong></td>
<td>3</td>
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<td></td>
<td>Introduction to skills and competencies of the clinical dietitian based on Nutrition Care Process (assessment, diagnosis, intervention, monitoring, and evaluation). Evidence-based practice promoted with emphasis on state-of-the-science and state-of-the-art of dietetics practice. PREREQ: NTDT200. RESTRICTIONS: Not available for credit to those who have taken NTDT450. Open only to APN, DIET and NS majors.</td>
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<tr>
<td>NTDT 266</td>
<td><strong>SPECIAL PROBLEM</strong></td>
<td>1-3 PF</td>
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<tr>
<td></td>
<td>Sophomore level independent study.</td>
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<tr>
<td>NTDT 268</td>
<td><strong>SOPHOMORE SPECIAL TOPICS</strong></td>
<td>1-6</td>
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<tr>
<td></td>
<td>Sophomore level independent study.</td>
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<tr>
<td>NTDT 301</td>
<td><strong>CULTURAL PERSPECTIVES ON FOOD AND NUTRITION</strong></td>
<td>3</td>
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<td></td>
<td>Examination of the cultural context from which ethnic foods and food habits emerge and evolve; social, religious, geographic and economic influences on ethnic dietary practices of culturally distinct groups; United States immigration patterns, cultural adaptations and nutrition-related health problems for selected groups.</td>
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<tr>
<td>NTDT 305</td>
<td><strong>NUTRITION IN THE LIFESPAN</strong></td>
<td>3</td>
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<td>Nutrition and health during the different stages of life: pregnancy, lactation, infancy, preschool years, middle childhood, adolescence, adulthood and later maturity. PREREQ: NTDT200 and a course in biology.</td>
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<tr>
<td>NTDT 310</td>
<td><strong>NUTRITION AND ACTIVITY</strong></td>
<td>3</td>
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<td>Energy and nutrient needs for activity with emphasis on particular physical and athletic activities; common myths and fallacies concerning diet and athletic performance; and appropriate dietary approaches for specific activities and active people. PREREQ: NTDT200 and a physiology course</td>
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<tr>
<td>NTDT 321</td>
<td><strong>QUANTITY FOOD PRODUCTION AND SERVICE</strong></td>
<td>3</td>
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<td></td>
<td>Principles of quantity food production and delivery systems; menu planning and purchasing design; safety, sanitation and technical operations in a food service system. PREREQ: NTDT200 and NTDT201</td>
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<tr>
<td>NTDT 322</td>
<td><strong>MANAGEMENT OF FOOD AND NUTRITION SERVICES</strong></td>
<td>3</td>
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<td></td>
<td>Organization and administration of not-for-profit and entrepreneurial services. Functions and responsibilities related to these products including planning, marketing, total quality and human resource management, and food and labor cost accounting. PREREQ: NTDT200 and NTDT201</td>
<td></td>
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</tbody>
</table>
Laboratory experience in quantity food production and delivery with emphasis on equipment, production methods, quality standards and controls and environmental issues. Development of food production design considering material flow, functional areas and utility requirements. Food safety certification.

**Prerequisite:** NTD T200, NTD T250

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Open only to senior dietetics majors.

**Discussion of the impact of diet and nutrition on the aging process, field experiences with older adults across the spectrum of aging, and design and implementation of interactive nutrition education programs with older adults.

**Prerequisite:** NTD T200, and BISC 106 or BISC 276

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Open only to senior dietetics majors.

**Metabolism of carbohydrates, proteins and fats in human nutrition, interdependence and relation to energy metabolism/balance, scientific bases of macronutrient requirement during the life cycle.

**Prerequisites:** NTD T200, CHEM 214 and CHEM 216

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Open only to senior dietetics majors.

**Mechanisms and interactions of vitamins and minerals in cellular metabolism, scientific bases of nutrient requirements during the life cycle.

**Prerequisites:** NTD T400

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Open only to senior dietetics majors.

**Provides direction for career decisions, including self-assessment, resume development, and interview preparation. Focuses on the post-baccalaureate career pathways of employment, graduate study, and the supervised practice experience. Explores registration, specialty certification and licensure for dietitians.

**Restrictions:** Open only to senior dietetics majors.


**Prerequisites:** NTD T200

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Open only to seniors only.

**Maternal physiological adjustments in pregnancy and their relationship to nutritional needs; effect of maternal nutrition on fetal growth and development; physiology of lactation and maternal nutrient needs; and neonatal nutritional needs and current infant feeding practices.

**Prerequisites:** NTD T400 and BISC 106 or BISC 276

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Open only to seniors only.

**Nutritional screening and assessment methods and techniques including evaluation of dietary intake, anthropometric measurements, biochemical tests and clinical assessment. Overview of the methodologies involved in nutrition research.

**Prerequisites:** NTD T400 and a course in statistics

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Open to juniors and seniors only.

**Pathophysiology, diet and disease relationships, and diet therapy for diabetes, obesity, neurological disorders, gastrointestinal, cardiovascular, musculoskeletal, and respiratory diseases. Evidence based practice and skills for nutritional management are integrated into course topics.

**Prerequisites:** NTD T250, NTD T400, BISC 276

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Majors only.

**Pathophysiology, diet and disease relationships, and diet therapy for liver and renal disease, cancer, AIDS, inborn errors of metabolism, fluid balance and acid base abnormalities, and physiological stress and trauma. Evidence based practice and skills for nutritional management are integrated into course topics.

**Prerequisites:** NTD T250, NTD T400, BISC 276

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Majors only.

**In-depth analysis of a specific topic in an area of nutrition and dietetics

**Restrictions:** Junior-level NTD T course(s) relating to the specific topic required.

**Presents major nutritional problems that influence the health, survival and developmental capacity of populations in low income (developing) countries. Addresses these major issues as a problem of socio-economic development. The course will also address issues of culture, agriculture, economics, water sanitation and disaster.

**Restrictions:** Restricted to junior and senior level students.

**Nutritional care as a part of health maintenance, health promotion, and health care delivery in community settings; the relationship of community resources, structure and dynamics to an individual’s ability to be well fed. Community nutrition needs and programs. Means of effecting change in nutrition knowledge and practices in populations. Teaching methods include lecture, field work, case studies. The field work is provides 30 hours of supervised service in a community nutrition or health agency.

**Prerequisites:** NTD T321 and NTD T400

**Restrictions:** Students are offered site opportunities and final placement is managed by the instructor.

**Senior level independent study.

**Course Notes:**
- **Credits:** 1-6
- **Restrictions:** Open only to senior dietetics majors.

**Travel study of transcultural food habits: attitudes, beliefs, customs and taboos. Visits to major food industries and health organizations and interaction with indigenous population.

**Prerequisite:** NTD T200

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Open to dietetic internship students only.

**Introduces supervised practice experiences for incorporation and application of skills, knowledge, and attitudes with special emphasis on current dietetic issues facing the health professional in public health nutrition.

**Corequisite:** NTD T 650

**Restrictions:** Open to dietetic internship students only.

**Continued supervised practice experiences for incorporation and application of skills, knowledge, and attitudes, focusing on entry-level competence with special emphasis on current dietetic issues facing the health professional.

**Prerequisite:** NTD T550, NTD T651

**Restrictions:** Open to dietetic internship students only.

**Course Notes:**
- **Credits:** 1-12
- **Restrictions:** Open only to seniors only.


**Prerequisite:** Any 3 credit, 200 level or above, course in Nutrition

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Open only to seniors only.

**Metabolism and its relation to human nutrition; current literature; methods and techniques of nutrition research.

**Prerequisite:** Course in macronutrients.

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Open only to seniors only.

**Biochemical and physiological aspects of vitamin metabolism as it relates to human nutrition; assessment of requirements; factors affecting needs and utilization; review of literature and current issues.

**Prerequisite:** Biochemistry course (undergraduate or graduate).

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Open only to seniors only.

**Biochemical and physiological aspects of mineral metabolism as it relates to human nutrition; assessment of requirements; factors affecting needs and utilization; review of literature and current issues.

**Prerequisite:** Biochemistry course (either undergraduate or graduate).

**Course Notes:**
- **Credits:** 3
- **Restrictions:** Open only to seniors only.
<table>
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NTDT 615</td>
<td><strong>ADVANCED NUTRITION AND PHYSICAL ACTIVITY</strong></td>
<td>3</td>
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<tr>
<td></td>
<td>Critical analysis of current research on effects of nutrition, food and diet on physical activity and optimal athletic performance. Develops specific topics and interests through independent projects. PREREQ: Undergraduate nutrition and physiology courses.</td>
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<tr>
<td>NTDT 620</td>
<td><strong>MATERNAL AND INFANT NUTRITION</strong></td>
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<td></td>
<td>Maternal physiological adjustments in pregnancy and their relationship to nutritional needs; effect of maternal nutrition on fetal growth and development; physiology of lactation and maternal nutrient needs; neonatal nutritional needs and current infant feeding practices. PREREQ: NTDT400 and BISC100, BISC276.</td>
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<tr>
<td>NTDT 622</td>
<td><strong>RESEARCH METHODS IN NUTRITION ASSESSMENT</strong></td>
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<td>Advanced study of nutrition status assessment methods from a research perspective. Principles/assumptions of methods; critical evaluation of literature as it relates to contemporary issues. Course culminates with study design/research proposal development. PREREQ: Introduction to Nutrition course (undergraduate) Human physiology course (undergraduate or graduate) Statistics course (undergraduate or graduate).</td>
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<tr>
<td>NTDT 640</td>
<td><strong>NUTRITION AND AGING</strong></td>
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<td>Addresses topics related to the effects of aging on fundamental nutrition processes, food and nutrient requirements, nutrition screening and assessment of nutritional status, nutrition intervention and food assistance programs and nutrition related disease in older adults. PREREQ: NTDT400 or NTDT401.</td>
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<tr>
<td>NTDT 645</td>
<td><strong>TEACHING METHODS:NUTRITION/FOODS</strong></td>
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<td>Needs assessment; writing instructional objectives; selecting appropriate methods, materials and resources for audiences varying in age, literacy and ethnicity; planning, implementing and evaluating education programs related to food and nutrition. PREREQ: NTDT720. RESTRICTIONS: Instructor permission required for non-majors.</td>
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<tr>
<td>NTDT 650</td>
<td><strong>CURRENT PERSPECTIVES IN DIETETICS I</strong></td>
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<td>Introduces exploration of roles and responsibilities of today's dietitian in food service management, clinical and community dietetics. Emphasis on concepts relevant to evolving therapies and technologies in the profession and issues influencing ethical, legal and professional responsibilities of dietitians.</td>
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<tr>
<td>NTDT 651</td>
<td><strong>CURRENT PERSPECTIVES IN DIETETICS II</strong></td>
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<tr>
<td></td>
<td>Continued exploration of roles and responsibilities of today's dietitian in clinical, community and food service management dietetics. Emphasis on concepts relevant to evolving therapies and technologies in the profession and issues that influence ethical, legal and professional responsibilities of dietitians.</td>
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<tr>
<td>NTDT 652</td>
<td><strong>TOPICS IN NUTRITION AND DIETETICS</strong></td>
<td>1-3</td>
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<td>Analysis of a specific topic in area of nutrition and dietetics. RESTRICTIONS: Requires permission of instructor.</td>
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<tr>
<td>NTDT 654</td>
<td><strong>ADVANCED RUMINANT NUTRITION</strong></td>
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<td>Emphasis of metabolic aspects of ruminant microbiology and intermediary metabolism. Discussions on methods to partition nutrients at the tissue level and methods to alter rumen fermentation. Crosslisted with ANFS544. PREREQ: Undergraduate or graduate courses in nutrition, microbiology, biochemistry, ANFS545 or equivalents. ANFS404 or ANFS417 recommended.</td>
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<tr>
<td>NTDT 655</td>
<td><strong>ISSUES IN INTERNATIONAL NUTRITION</strong></td>
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<td>Presents major nutritional problems that influence the health, survival and developmental capacity of populations in low income (developing) countries. Addresses these major issues as a problem of socio-economic development. The course will also address issues of culture, agriculture, economics, water sanitation and disaster. RESTRICTIONS: Restricted to graduate students.</td>
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<td>NTDT 660</td>
<td><strong>COMMUNITY NUTRITION</strong></td>
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<td>Nutritional care as part of health maintenance and health care delivery; relationship of community resources, structure and dynamics to an individual's ability to be well fed. Nutritional needs and programs. Nutrition program planning and evaluation; community assessment techniques. PREREQ: Advanced nutrition course. RESTRICTIONS: Permission of instructor required for non-majors.</td>
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<tr>
<td>NTDT 665</td>
<td><strong>SEMINAR</strong></td>
<td>1-3 PF</td>
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<tr>
<td>NTDT 666</td>
<td><strong>SPECIAL PROBLEM</strong></td>
<td>1-12</td>
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<tr>
<td>NTDT 668</td>
<td><strong>RESEARCH</strong></td>
<td>1-6</td>
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<tr>
<td>NTDT 669</td>
<td><strong>FIELD PROJECT OR THEORETICAL PAPER</strong></td>
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<td>Development, preparation and defense of written report of field project observations or theoretical analysis. RESTRICTIONS: Requires permission of instructor.</td>
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<tr>
<td>NTDT 675</td>
<td><strong>TRANSCULTURAL FOOD HABITS</strong></td>
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<td>Travel study of transcultural food habits: attitudes, beliefs, customs and taboos. Visits to major food industries and health organizations and interaction with indigenous population. PREREQ: NTDT200 RESTRICTIONS: Only three credit hours may count toward graduation for majors.</td>
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<tr>
<td>NTDT 680</td>
<td><strong>EXERCISE, NUTRITION AND BONE HEALTH</strong></td>
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<td>Role of exercise and diet in development and maintenance of skeleton, including exercise protocols, nutrients, exercise nutrient interactions and assessment tools. PREREQ: BISC276 or equivalent and NTDT200 or equivalent.</td>
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<tr>
<td>NTDT 866</td>
<td><strong>SPECIAL PROBLEM</strong></td>
<td>1-12</td>
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<tr>
<td>NTDT 868</td>
<td><strong>RESEARCH</strong></td>
<td>1-6</td>
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<tr>
<td>NTDT 869</td>
<td><strong>MASTER'S THESIS</strong></td>
<td>1-6</td>
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**NURSING**

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<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS 100</td>
<td><strong>NEW STUDENT CONNECTIONS</strong></td>
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<td>Provides first semester students in College of Health and Nursing Sciences opportunities to explore and become familiar with the college and university. Students acquire information on campus resources and gain practical skills helpful for a successful transition to college. RESTRICTIONS: Open to nursing majors only.</td>
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<tr>
<td>NURS 101</td>
<td><strong>HUMAN ANATOMY</strong></td>
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<td>Introduction to the study of human anatomy which provides a foundation for the future study of human physiology and other related courses. Includes a clinically relevant, fundamental overview of the human body using a &quot;systems&quot; approach. RESTRICTIONS: Open to nursing and health studies majors only.</td>
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<tr>
<td>NURS 110</td>
<td><strong>NURSING CONNECTIONS</strong></td>
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<td>Introduction to the profession of nursing and basic clinical nursing skills. Includes the roles of nursing, historical development and nursing philosophy. RESTRICTIONS: Open to nursing majors only.</td>
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<td>NURS 166</td>
<td><strong>SPECIAL PROBLEM</strong></td>
<td>1-3</td>
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<tr>
<td>NURS 200</td>
<td><strong>CLINICAL DECISION MAKING</strong></td>
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<td>Introduces and explores nurses' decision making processes including the nursing process. Builds upon basic clinical skills with psychomotor, cognitive, and affective skills used by nurses, introduces concepts of aging and uses aging to exemplify aspects of the nursing process. PREREQ: ENG110. COREQ: NURS110. RESTRICTIONS: Open to nursing majors only.</td>
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<td>NURS 214</td>
<td><strong>HEALTHCARE COMMUNICATION:UDSP</strong></td>
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<td>Nursing and Theater course where students will learn to be standardized patients and patient family members. Students will then be used in mock real life scenarios to assess the medical and communication skills of student health care providers. May be crosslisted with THEA214.</td>
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<tr>
<td>NURS 222</td>
<td><strong>PHARMACOLOGY</strong></td>
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<td>Focuses on therapeutic and adverse biological, psychological and social reactions to pharmaceutical agents. Drug use and medication abuse, client teaching, laboratory data and current research discussed. Nursing responsibilities and clinical applications emphasized. RESTRICTIONS: Open to nursing majors only.</td>
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<tr>
<td>NURS 235</td>
<td><strong>HEALTH, VULNERABILITY, &amp; DIVERSITY</strong></td>
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<td>Focuses on health promotion and cultural diversity in individuals, families, and communities across the lifespan. Special attention is paid to the nursing care of vulnerable populations. Diverse points of view regarding wellness, self-care and personal growth are emphasized. PREREQ: NURS110. RESTRICTIONS: Nursing majors only.</td>
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<td>NURS 241</td>
<td><strong>SCIENTIFIC BASIS OF NURSING</strong></td>
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<td>Examines pathophysiological concepts as a scientific basis of disease processes. Focuses on major body systems, including immune, endocrine, neurological and psychological. Emphasizes concepts of cancer, pain and infection. PREREQ: BISC207, CHEM105, NURS110. RESTRICTIONS: Open to nursing majors only.</td>
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</table>
NURS 242  SCIENTIFIC BASIS OF NURSING  3
Examines pathophysiological concepts as a scientific basis of disease processes. Focuses on major body systems, including cardiovascular, respiratory, gastrointestinal and renal. Emphasizes concepts of fluids and electrolytes. PREREQ: BISC207, CHEM105, NURS110. RESTRICTIONS: Open to nursing majors only.

NURS 251  MINDFULNESS BASED STRESS REDUCTION  3
Designed to cultivate mindfulness, a unique way of paying attention to present moment experience that strengthens the innate capacity to calm and heal both body and mind. Implications in health care, patient care and self-care as it relates to stress, pain and illness will be examined. Students will begin a mindfulness meditation practice and learn the foundational attitudes of mindfulness for daily living that will increase compassion and authenticity for their professional careers as well as improve their sense of wellbeing.

NURS 253  HEALTH AND PHYSICAL ASSESSMENT  3
Introduces and develops the clinical skill of physical examination and health assessment across the lifespan. Laboratory assignments and field experiences develop history taking and physical assessment skills with developmental and cultural implications included. PREREQ: NURS110, NURS200. RESTRICTIONS: Open to traditional nursing majors only.

NURS 266  SPECIAL PROBLEM  1-3

NURS 312  PATHOPHYSIOLOGY  4
Focuses on biological processes leading to alterations of body structure and functions. Emphasis on identification of etiology and pathogenesis of selected diseases. RESTRICTIONS: Open to nursing majors only.

NURS 320  TRANSITION TO BACCALAUREATE NURSING  3
Provides an orientation to the education process at UD. Emphasizes knowledge essential for successful program completion including: APA format, formal paper writing, professionalism in nursing, critical reading research articles, evidence-based practice, and strategies for learning. RESTRICTIONS: Eligible students include those matriculated in the RN to BSN or RN to MSN program.

NURS 325  CRITICAL ISSUES IN HEALTHCARE  3
Examines current trends in the nursing profession and in the larger healthcare system. Examines the role of the professional nurse in current and future health care delivery systems and models. Broadens awareness of the larger systemic context of professional nursing. Evidence-based practice and critical inquiry will be applied to participant's current professional experiences. COREQ: NURS320. RESTRICTIONS: Eligible students include those matriculated in the Baccalaureate for the Registered Nurse Program.

NURS 350  WELLNESS AND HEALTH ASSESSMENT  3
Explores selected concepts, theories and skills utilized in health promotion and disease prevention of individuals from socioculturally diverse populations within the context of family, community and healthcare systems. Key elements include a health history, physical, and psychosocial assessment. COREQ: NURS320. RESTRICTIONS: Open to BRN majors only. Course sequence alteration requires permission of instructor.

NURS 352  ADULT HEALTH NUR Sing  4
Examines selected concepts and theories related to restoring and maintaining optimal health in adult populations. Focuses on major body systems, including immune, endocrine, renal and gastrointestinal; also discusses concepts of cancer. Selected laboratory and field experiences are included to enhance concepts. PREREQ: NURS222, NURS241 & NURS242 or NURS312, NURS250 or NURS253. RESTRICTIONS: Open to nursing majors only.

NURS 354  PSYCHOSOCIAL NUR Sing  3
Prepares and examines selected concepts and theories related to restoring and maintaining optimal health of patients experiencing psychopathology. Selected laboratory and field experiences are included to enhance concepts. PREREQ: NURS222, NURS241 & NURS242 or NURS312, NURS250 or NURS253. RESTRICTIONS: Open to nursing majors only.

NURS 356  CARE OF CHILDREN AND FAMILIES  3
Presents selected concepts and theories related to the nursing care of infants, children and adolescents and their families. Selected laboratory and field experiences are included to enhance concepts. PREREQ: NURS222, NURS241 & NURS242 or NURS312, NURS250 or NURS253. RESTRICTIONS: Open to nursing majors only.

NURS 358  WOMEN'S HEALTH NUR Sing  3
Presents selected concepts and theories related to nursing care of the childbearing family and major women's health issues. Selected laboratory and field experiences included to enhance concepts. PREREQ: NURS222, NURS241 & NURS242 or NURS312, NURS250 or NURS253. RESTRICTIONS: Open to nursing majors only.

NURS 362  RESEARCH CONCEPTS IN HEALTHCARE  3
Application of the research process and the research utilization process to healthcare practice. PREREQ: STAT200 or MATH201. RESTRICTIONS: Open to nursing and health studies majors only.

NURS 366  INDEPENDENT STUDY  1-6

NURS 372  ADULT HEALTH NUR Sing  4
Examines selected concepts and theories related to restoring and maintaining optimal health in adult populations. Focuses on major body systems, including cardiovascular, respiratory, and neurological. PREREQ: NURS222, NURS241 & NURS242 or NURS312, NURS250 or NURS253. RESTRICTIONS: Open to nursing majors only.

NURS 382  COMMUNITIES AND HEALTH POLICY  2
Examines nurse's role in community health and health policy. Major issues affecting healthcare and current political issues examined. Issues of bioterrorism, environment, and occupational health included. PREREQ: NURS222, NURS241 & NURS242 or NURS312, NURS250 or NURS253. RESTRICTIONS: Open to nursing majors only.

NURS 390  CLINICAL WORK EXPERIENCES  1-2 PF
Students receive credit for approved healthcare-related work/volunteer experience. Students must work/volunteer in an appropriate healthcare-related position and credit will be given based on hours worked. PREREQ: NURS200 or NURS220. RESTRICTIONS: Open to nursing majors only.

NURS 411  TOPICS IN HEALTHCARE DELIVERY  3
Consideration of selected issues and problems of nursing practice within the healthcare delivery system. Exploration of some topics may include a laboratory or clinical component. Variable topics. RESTRICTIONS: Open to nursing and health studies majors, or by permission of professor. May be repeated for up to nine credit hours.

NURS 412  MULTICULTURAL TOPICS IN HEALTHCARE DELIVERY  3
Prepares a cultural consideration of selected issues and problems of nursing practice within the global healthcare delivery system. Exploration of some topics may include a laboratory or clinical component. Variable topics. RESTRICTIONS: Open to nursing and health studies majors, or by permission of instructor. May be repeated for up to nine credit hours.

NURS 413  BIOMEDICAL RESEARCH ETHICS  3
Critically examines scientific integrity and responsible conduct in biomedical and translational research within theoretical and social context of research ethics using case examples and previous experiences. Topics include: individual and institutional responsibilities for promoting scientific integrity; protection of the rights of the researcher and animal subjects; data issues; collaboration; authorship practices; intellectual property; and impact of future developments in science. Students write case analyses, reflections and critiques about field experiences to ethical review boards and research laboratories and discuss the culmination of their experiences specific to research ethics.

NURS 414  WOMEN AND GENDER IN HEALTHCARE  3
Explores women's healthcare issues from the perspective of gender needs within our healthcare delivery system. Global issues related to cultural needs, health beliefs and practices, lifestyle and lifestyle considerations, wellness goals, and health issues unique to women are the focus of content. May be crosslisted with WOMS414. RESTRICTIONS: Open to nursing, health studies, and women's studies majors and minors, or by permission of instructor.

NURS 416  MULTIMEDIA PROJECTS IN NUR Sing  1
Examines how to capture media segments while actively learning abroad. Explore archival digital media, prepare storyboards, write scripts, and create clips to highlight the diversity of the people's lives and healthcare abroad. Develop electronic portfolios that demonstrate their understanding of complex global issues and post their work on a program blog to share their experiences with those following the program from the U.S. COREQ: NURS411

NURS 435  LEADERSHIP AND MANAGEMENT IN HEALTH ORGANIZATIONS  3
Introduces the principles of leadership and management and their application in healthcare systems where nursing care is delivered. Focuses on the roles of nurse leaders and managers across practice settings. PREREQ: NURS200. RESTRICTIONS: Open to BRN majors only. Course sequence alteration requires permission of instructor.
NURS 442 COMMUNITY HEALTH NURSING 3
Focuses on conceptual foundations for community health nursing practice with the community, family and individual as clients. Diversity in nursing roles and practice is related to community health promotion and community health problems. PREREQ: NURS320.

NURS 443 BRN ROLE PRACTICUM 3
A preceptored clinical experience focused upon the integration of concepts learned in baccalaureate nursing education. PREREQ: NURS320, NURS362.

NURS 450 SYNTHESIS OF PROFESSIONAL NURSING PRACTICE 1 PF
Provides opportunities to bring key aspects of professional nursing practice together utilizing a systems framework. Includes student presentation of projects related to NURS443. PREREQ: All other courses in BRN program RESTRICTIONS: Open to BRN majors only. Course sequence alteration requires permission of instructor.

NURS 453 CLINICAL APPLICATIONS ADULT HEALTH NURSING I 3 PF
Clinical application of science and nursing theories of care for adult clients in hospitals. PREREQ: All 300-level required nursing courses RESTRICTIONS: Open to nursing majors only.

NURS 457 CLINICAL APPLICATIONS: MATERNAL CHILD NURSING 3 PF
Clinical application of science and nursing theories of care for infants, children, adolescents and childbearing families. PREREQ: All 300-level required nursing courses RESTRICTIONS: Open to nursing majors only.

NURS 459 CLINICAL APPLICATIONS: PSYCHOSOCIAL NURSING 3 PF
Clinical application of science and nursing theories of care for clients with acute and chronic psychiatric healthcare needs. PREREQ: All 300-level required nursing courses RESTRICTIONS: Open to nursing majors only.

NURS 460 TRANSITION TO PROFESSIONAL NURSING PRACTICE I 2
Using a seminar format, students discuss major issues associated with preparing the student nurse for professional nursing practice. Content assists students in integrating scientific and theoretical knowledge, focusing on professionalism, the job experience, legal and ethical issues, and application of selected concepts such as QSEN. Students reflect on the integration of class concepts within their clinical experiences. PREREQ: All required 300-level nursing courses. RESTRICTIONS: Open to nursing majors only.

NURS 464 TEACHING ASSISTANTSHIP IN NURSING 1-2 PF
Allows junior and senior nursing students to develop professional teaching, peer leadership, and communication skills while enhancing their knowledge base in course content. RESTRICTIONS: Must have a 3.0 GPA, have completed the course for which they TA in good standing, and be available the entire semester. Students must work at least 28 hours throughout the semester to receive 1 credit or 56 hours to receive 2 credits.

NURS 466 INDEPENDENT STUDY 1-6

NURS 473 CLINICAL APPLICATIONS: ADULT HEALTH NURSING II 3 PF
Advanced clinical application of science and nursing theories in acute care health settings. Builds upon clinical practice skills of NURS453. PREREQ: NURS453, NURS460 COREQ: NURS479 and NURS480 RESTRICTIONS: Open to nursing majors only.

NURS 477 CLINICAL APPLICATIONS: CARE OF POPULATIONS 3 PF
Clinical application of science and nursing theories in community health settings. Local, national, and global issues are addressed. PREREQ: NURS453, NURS457, NURS459, NURS460 COREQ: NURS479, NURS480 RESTRICTIONS: Open to nursing majors only.

NURS 478 HONORS: CARE OF POPULATIONS 3
Clinical application of science and nursing theories in community health settings. Local, national, and global issues are addressed. Focus is synthesis of knowledge, application of evidence based practice and reflection on their nursing care provided to families, aggregates, in the community. PREREQ: NURS453, NURS457, NURS459, NURS460. COREQ: NURS479, NURS473, NURS480. RESTRICTIONS: Open to honors nursing majors only.

NURS 479 CLINICAL PRECEPTORSHIP 3 PF
Clinical application of science and nursing theories in student-selected clinical settings. Provides a transition from student-faculty relationships to mentor-new graduate relationships. Students are mentored by a nurse preceptor. PREREQ: NURS453, NURS460. For accelerated students, NURS473 must precede NURS479. COREQ: NURS473, NURS480 RESTRICTIONS: Open to nursing majors only.

NURS 480 TRANSITION TO PROFESSIONAL NURSING PRACTICE II 2
Using a seminar format, students discuss major issues associated with professional nursing practice within the local and global health care system. Content assists students in integrating scientific and theoretical knowledge, focusing on domains of professional nursing care, nursing healthcare organizations, and nursing and the world. Students reflect on the integration of class concepts within their clinical experiences. PREREQ: NURS460. RESTRICTIONS: Open to nursing majors only.

NURS 499 ONCOLOGY NURSING: MULTICULTURAL PERSPECTIVES 3
Provides nursing students with an overview of selected aspects of oncology nursing for adults, with a focus on the multicultural aspects of cancer care. PREREQ: All sophomore nursing classes or permission of instructor. RESTRICTIONS: Nursing majors.

NURS 556 SPECIAL PROBLEM 1-12

NURS 600 ISSUES IN SCHOOL HEALTH NURSING 3
Focuses on roles of new school nurse and healthcare needs of school-age children and adolescents. Includes testing/screening, guidance/counseling, health teaching, and skills in school health setting. PREREQ: Registered nurse.

NURS 604 ADVANCED PRACTICE ROLES FOR HEALTHCARE PROVIDERS 3
Focuses on roles and issues affecting healthcare providers engaged in advanced practice. Roles are analyzed in relation to current issues and concepts of advanced practice. Crosslisted with HSAD604. RESTRICTIONS: Permission required from department.

NURS 609 NURSING SCIENCE: THEORY AND RESEARCH 4
Examines the science of nursing from theoretical and research perspectives and emphasizes theory as the foundation for research and practice. PREREQ: EDUC665. COREQ: EDUC665. RESTRICTIONS: Open to majors only. Permission required from department.

NURS 610 CROSSCULTURAL HEALTHCARE 3
An in-depth study of cultural diversity, delineating ethnocultural congruent healthcare practices in a pluralistic society. Assessment, planning and interventions for health promotion, illness and disease prevention, health restoration and health policy legislation are explored. RESTRICTIONS: Open to only to graduate students or by permission of instructor.

NURS 613 DEATH EDUCATION 3
Focuses on the field of death education, its relevance to everyday life and most specifically to the professional practice of practitioners providing support to the dying and bereaved. RESTRICTIONS: Admission to BRN major or BSN degree or bachelor's degree in another discipline.

NURS 615 INTEGRATIVE HEALTH 3
Focuses on the use of integrative therapies within a holistic framework of care. Integrative interventions are examined through research, demonstrations, and experiential learning. Self-care and personal growth of the healthcare provider is developed. The use of integrative therapies as a complement to standard medical practice to manage health conditions will be explored. RESTRICTIONS: Permission of instructor needed if student not a matriculated health care provider program.

NURS 616 PRIMARY CARE IN COMMUNITY HEALTH 3
Focuses on community based primary care issues in relation to individual, family, and community health. Clinical component includes health promotion and disease prevention activities. PREREQ: NURS622 and NURS621 and NURS604. COREQ: NURS604 and NURS620. RESTRICTIONS: Open to majors only. Requires permission from department. RESTRICTIONS: Open to majors only. Requires permission from department.

NURS 617 PRECEPTORSHIP I 3
Focuses on clinical topics in primary care relevant to each practitioner concentration. PREREQ: All required clinical courses except NURS627 RESTRICTIONS: Open to nursing majors only. Permission of department required.

NURS 619 FINANCIAL MANAGEMENT IN HEALTH SERVICES ORGANIZATIONS 3
Provides the basic principles and concepts of effective management of budgets for healthcare units. Includes analysis of the environment and departmental organization and their impact on healthcare. Crosslisted with HSAD619. RESTRICTIONS: Permission of department required.

NURS 620 ADVANCED HEALTH ASSESSMENT 3
Assists graduate students in acquiring advanced knowledge and proficiency in performing health assessments. Includes eliciting a complete health history and performing a comprehensive examination. PREREQ: NURS604 COREQ: NURS604 RESTRICTIONS: Requires permission of department.
NURS 621 ADVANCED PATHOPHYSIOLOGY
3
Develop a basic understanding of pathophysiology and use a body system approach to explore the pathophysiologic processes of selected common disorders and diseases of individuals across the lifespan. The pathophysiologic basis of disease will be examined within the context of evidence-based practice and population-based health principles. The impact of disease processes on individual health outcomes will also be emphasized.  
RESTRICTIONS: Permission of department required.

NURS 622 ADVANCED PHARMACOLOGY
3
Prepares the advanced practice nurse prescriber to provide safe and effective therapeutic interventions for individuals across the lifespan. Emphasis will be placed on pharmacotherapeutic systems, pharmacokinetics and pharmacodynamics as well as adverse drug effects, precautions and drug interactions for broad categories of drugs. Therapeutic agents will be discussed within the context of specific populations with attention to genetic, cultural, legal, ethical, and economic considerations. 
PREREQ: NURS621. COREQ: NURS621. RESTRICTIONS: Permission of department required.

NURS 623 MANAGEMENT OF WOMEN’S HEALTHCARE
3
Focuses on gynecological and reproductive primary healthcare. Emphasizes management of gynecologic health needs and the normal reproductive cycle. 
PREREQ: NURS604 and NURS622. COREQ: NURS604 and NURS622.

NURS 624 PRIMARY CARE OF CHILDREN
3
This course focuses on the delivery of primary care to children. Comprehensive health assessment of children, including health promotion needs, growth and development, family and cultural dynamics, physical and psychosocial status is addressed. Emphasis is placed on pharmacologic and non-pharmacologic therapies appropriate for the management of children experiencing episodic illness and selected chronic illnesses and disabilities. 
PREREQ: NURS693 NURS694. COREQ: NURS696. RESTRICTIONS: Open to AGNP and FNP students only.

NURS 625 MANAGEMENT OF ADULT EPISODIC HEALTH NEEDS AND PROBLEMS
3
Focuses on delivery of primary care to adults and the elderly with acute episodic health problems. Emphasizes the clinical decision making necessary to serve as a foundation for planning primary healthcare services. 
PREREQ: NURS620 and NURS621. RESTRICTIONS: NURS604 and NURS622 required as prerequisites or corequisites.

NURS 626 MANAGEMENT OF ADULT CHRONIC HEALTH NEEDS AND PROBLEMS
3
Focuses on delivery of primary care to adults and the elderly with chronic health problems. Emphasizes management of ongoing needs. 
PREREQ: NURS620 and NURS621. RESTRICTIONS: NURS604 and NURS622 required as prerequisites or corequisites.

NURS 627 PRECEPTORSHIP II
3
Emphasizes clinical decision making in an interdisciplinary environment with the nurse practitioner as the principal provider of primary care. 
PREREQ: NURS617. COREQ: NURS617.

NURS 635 HEALTH ADMINISTRATION THEORIES
3
Theories of administration, organization and management, their interaction with other health discipline theories and their influence on management of healthcare agencies. Includes the interaction of theories with attainment of institutional goals. Crosslisted with HSAD635. PREREQ: NURS604. COREQ: NURS604.

NURS 636 ADULT-GERONTOLOGY I
4
This course provides knowledge needed to develop core CNS practice competencies in Adult-Gerontology. These include therapeutic interventions (health promotion, disease prevention, health coaching, and restoration of health), education of patients and caregivers, evidence-based practice, consultation, interdisciplinary collaboration, and healthcare issues across the adult life span. COREQ: NURS604; NURS621. RESTRICTIONS: Open to clinical nurse specialist students only.

NURS 637 HEALTH PLANNING STRATEGIES
3
Analyzes organizational systems and roles of managers and administrators. Students identify organizational needs, formulate goals and objectives appropriate to healthcare agencies and identify strategies appropriate to accomplishing goal attainment with ethical constraints of healthcare. Crosslisted with HSAD637. PREREQ: NURS604 and NURS609 or Permission of Instructor. COREQ: NURS604.

NURS 638 HEALTH SERVICES EVALUATION
3
Emphasizes the role of managers and administrators in personnel development, promotion of research in clinical settings and development and implementation of quality improvement initiatives and their implications for healthcare. Crosslisted with HSAD638. PREREQ: NURS604 and NURS609. COREQ: NURS604.

NURS 639 HUMAN RESOURCE MGMT IN HEALTH CARE
3
Principles, policies, and practices related to the recruitment, development, maintenance, and utilization of human resources in organizations, with particular focus paid to the demands of healthcare organizations.

NURS 641 PRIMARY/EPISODIC CARE: ADULT-GERO
3
This clinical course focuses on care of adults needing primary care for episodic health problems. Assessment, analytic skills for differential diagnoses, and use of evidence based guidelines and holistic management are emphasized. Mentored clinical experiences on healthcare teams promote independent and interprofessional patient-centered practice. 
PREREQ: NURS620, NURS621. COREQ: NURS622.

NURS 642 PRIMARY/CHRONIC CARE: ADULT-GERO
3
This clinical course focuses on adults needing primary care for chronic health problems. Assessment and analytic skills for differential diagnoses, application of evidence-based guidelines and holistic management are emphasized. Mentored clinical experiences on healthcare teams promote independent and interprofessional patient-centered practice. 
PREREQ: NURS620, NURS621. COREQ: NURS622, NURS641.

NURS 643 PRIMARY/COMPLEX CARE: ADULT-GERO
3
This clinical course focuses on delivery of primary health care to older adults with acute and chronic health problems, disabilities, palliative care needs, and end of life. Content focuses on healthy aging, prevention, pharmacologic and non-pharmacologic management, and coordination of care with other disciplines. 
PREREQ: NURS620, NURS621. COREQ: NURS622, NURS641, NURS642.

NURS 644 NURSE PRACTITIONER PRECEPTORSHIP I
3
Focuses on the delivery of primary care to patients in primary care practice sites across the lifespan. Serves as a part of a culminating experience in role development. Clinical practice sites will serve as an environment for students to develop primary care clinical skills as a novice nurse practitioner by working with a preceptor.

NURS 645 NURSE PRACTITIONER PRECEPTORSHIP II
3
Serves as a culminating experience in role development. In conjunction with clinical practice, it provides an environment for students to examine ways to monitor and ensure quality primary care while practicing as a Nurse Practitioner. Clinical seminar topics include peer review, interdisciplinary communication and collaboration, ethical decision making, political and legal issues, and other professional issues such as responsibility, autonomy, and accountability.

NURS 646 ADULT-GERONTOLOGY II
4
Provides opportunities to develop advanced skills (e.g., case management) inherent to the CNS role. Course content focuses on leadership, collaboration, citizenship, cost effective care, innovations in practice, and mentorship as they relate to care for adults across the life span. 
PREREQ: NURS636. RESTRICTIONS: Open to graduate clinical nurse specialist students only.

NURS 654 NURSING OF CHILDREN I
4
Explores the scientific basis for the routine healthcare guidance required by children and their families. Focuses primarily on the acutely ill child. 
PREREQ: NURS604 and NURS621. COREQ: NURS604 and NURS621.

NURS 655 NURSING OF CHILDREN II
4
Explores the biopsychosocial needs of children with chronic conditions and their families. Emphasizes the interventions of the advanced practice nurse to assist these children to attain, maintain or regain health. 
PREREQ: NURS654 RESTRICTIONS: Open to matriculated graduate nursing students only.

NURS 664 NURSING PRACTICUM
3
In conjunction with the faculty advisor and based on the student’s individualized long range goals, the student selects a preceptor and healthcare setting in which to apply didactic contact in real life settings. Requires 135 hours of on-site experience, which can be taken in one semester or divided over three semesters. 
PREREQ: NURS635, NURS637, or NURS638. COREQ: NURS635, NURS637, or NURS638.

NURS 666 SPECIAL PROBLEM
1-12

NURS 668 ADVANCED CLINICAL NEUROSCIENCE
3
Explores advanced concepts of neuroanatomy and neurophysiology including structural and functional components of the nervous system. Special attention will be given to normal and abnormal neurodevelopment across the lifespan. Students will be exposed to genetic/epigenetic advances in neuroscience. Relevance to lifespan mental illnesses is a major course focus. 
PREREQ: NURS621 NURS622. COREQ: NURS621 NURS622. RESTRICTIONS: Requires permission of department.
NURS 669 ADVANCED PSYCHOPHARMACOLOGY 3
Explores advanced pharmacokinetics and pharmacodynamics of all psychoactive medication classes. Emphasizes the clinical management of psychiatric symptoms within the context of lifespan mental illness. Examines evidenced-based treatment and best practices in pharmacologic intervention. Highlight legal/ethical issues related to prescribing.
PREREQ: NURS622, NURS688. COREQ: NURS658. RESTRICTIONS: Requires permission of department.

NURS 670 ADVANCED LIFESPAN PSYCHOPATHOLOGY 3
Explores nosology and etiology of mental illnesses across the lifespan with emphasis on different diagnosis. Examines selected theories of psychopathology and scientific findings. Highlights trends, research, ethical implications, and limitations of nosology and labeling. Cultivates interviewing and assessment skills using simulation and/or field experiences.
PREREQ: NURS620. RESTRICTIONS: Requires permission of department.

NURS 671 PSYCHIATRIC MENTAL HEALTH NURSING I 3
Explores nosology and etiology of mental illnesses across the lifespan with emphasis on differential diagnosis. Selected theories of psychopathology and scientific findings. Trends, research, ethical implications, and limitations of nosology and labeling are highlighted. Cultivates interviewing and assessment skills. Develop strategies for health promotion, disease prevention, and management of selected major mental health conditions across the lifespan. Integrates analysis and application of selected clinical modalities.
PREREQ: NURS658, NURS669. RESTRICTIONS: Open to Psych NP concentration only.

NURS 672 PSYCHIATRIC/MENTAL HEALTH NURSING II 3
Focus on continued development of strategies for health promotion, disease prevention, and management of selected mental health conditions across the lifespan. Focus on refinement of analytic skills used for differential diagnosis and clinical decision-making. Integrates analysis and application of selected clinical modalities within the context of clinical case discussion.
PREREQ: NURS668, NURS659, NURS671. RESTRICTIONS: Open to Psych NP concentration only.

NURS 673 PSYCHIATRIC/MENTAL HEALTH NURSING III 3
Continued development of strategies for health promotion, disease prevention, and management of selected mental health conditions across the lifespan. Refinement of analytic skills used for differential diagnosis and clinical decision-making, continued utilization of current evidence-based practice guidelines, and provision of holistic patient care management approaches. Integrates analysis and application of selected clinical modalities within the context of clinical case discussion.
PREREQ: NURS658, NURS669, NURS671, NURS672. RESTRICTIONS: Open to Psych NP concentration only.

NURS 674 PSYCH/MENTAL HEALTH NP PRACT 1 3 PF
First clinical experience for psychiatric nurse practitioner students. Mentored clinical experiences with selected patients across the lifespan. Students will develop advanced interviewing and assessment skills with selected clinical populations. Students will manage selected mental illnesses under the supervision of clinical preceptors Emphasis on providing care within an interdisciplinary health care framework.
PREREQ: NURS658 NURS669. COREQ: NURS671. RESTRICTIONS: Open to Psych NP concentration only.

NURS 675 PSYCH/MENTAL HEALTH NP PRACT 2 3
Second clinical experience for psychiatric nurse practitioner students. Knowledge learned in the didactic course will be applied in the mental health care setting during mentored clinical experiences with selected patients across the lifespan. Students will manage selected mental illnesses under the supervision of clinical preceptors. Students are expected to require less input from preceptors for clinical decision-making. Emphasis will be placed on providing care within an interdisciplinary health care framework.
PREREQ: NURS674. COREQ: NURS672. RESTRICTIONS: Open to Psych NP concentration only.

NURS 676 PSYCHIATRIC/MENTAL HEALTH NP PRACTICUM 3 3 PF
Provides the third clinical experience for psychiatric/mental health nurse practitioner students. Knowledge learned in the didactic courses will be applied in the psychiatric setting during mentored clinical experiences. Manage common episodic and chronic conditions at the advanced level, under the supervision of clinical preceptors.
PREREQ: NURS672 and NURS675. COREQ: NURS673. RESTRICTIONS: Open to Psych/Mental Health NP students only.

NURS 677 ADVANCED HEALTH ASSESSMENT & DIAGNOSTIC REASONING 3
Focuses on the integration of health assessment skills needed to provide culturally sensitive patient-centered care to individuals across the lifespan. Skills in comprehensive history-taking, physical examination, and the process of formulating differential diagnosis will be developed. Gain expertise in data collection, hypothesis formulation, and decision-making through practice in the laboratory setting.

NURS 678 PRIMARY CARE OF WOMEN 2
Focuses on gynecological and reproductive primary health care of women over the lifespan. Management of gynecological health care needs and the normal reproductive cycle in women will be emphasized. Strategies for health promotion, disease prevention, and management of selected episodic and chronic diseases commonly seen in primary care of women will be addressed.
PREREQ: NURS693 and NURS694. COREQ: NURS696. RESTRICTIONS: Open to FNP and AGNP students only.

NURS 679 PRIMARY CARE OF CHILDREN 3
Focuses on the delivery of primary health care to children. Comprehensive health assessment of children, including health promotion needs, growth and development, family and cultural dynamics, physical and psychosocial status is addressed. Emphasis is placed on pharmacologic and non-pharmacologic therapies appropriate for the management of children experiencing episodic illness and selected chronic illnesses and disabilities.
PREREQ: NURS693 and NURS694. COREQ: NURS696. RESTRICTIONS: Open to FNP and AGNP students only.

NURS 686 CLINICAL NURSE SPECIALIST ROLE INTEGRATION 4
Integration of theories and concepts related to roles of the clinical nurse specialist. Emphasizes advanced practice roles within the broad context of healthcare.
PREREQ: All required clinical courses

NURS 687 NURSING SCIENCE: RESEARCH APPLICATION 3
Focuses on the application of research to nursing practice. Includes critical analysis of research through an organized critique process, examination of data, and examination of facilitators and barriers to research/research utilization, models of research utilization, and methods of quality management.
PREREQ: NURS609 RESTRICTIONS: Open to majors only. Permission required from department.

NURS 691 PRIMARY CARE I 4
This is the first diagnosis and management course that will prepare the family and adult-geriatric nurse practitioner student for primary care of individuals from adolescence through adulthood. Focuses on development of strategies for health promotion, disease prevention, and management of selected episodic and chronic diseases commonly seen in primary care settings.
PREREQ: NURS677, NURS621 and NURS622. COREQ: NURS692. RESTRICTIONS: Open to FNP and AGNP students only.

NURS 692 PRIMARY CARE NP PRACTICUM I 4 PF
Provides the first clinical experience for family and adult-geriatric nurse practitioner students. Knowledge learned in didactic courses will be applied in the primary care setting during mentored clinical experiences with individuals from adolescence through adulthood. Manage common episodic and chronic conditions at the beginning level, under the supervision of clinical preceptors. Students are expected to require a great deal of input from preceptors for clinical decision-making at this level.
PREREQ: NURS621, NURS622 and NURS677. COREQ: NURS691. RESTRICTIONS: Open to FNP and AGNP students only.

NURS 693 PRIMARY CARE II 4
This is the second diagnosis and management course for family and adult-geriatric nurse practitioner students. The focus of this course is on continued development of strategies for health promotion, disease prevention, and management of selected acute episodic, and chronic diseases commonly seen in primary care settings.
PREREQ: NURS691 and NURS692. COREQ: NURS694. RESTRICTIONS: Open to FNP and AGNP students only.

NURS 694 PRIMARY CARE PRACTICUM II 4 PF
The second clinical experience for family and adult-geriatric nurse practitioner students. Knowledge learned in the didactic course will be applied in the primary care setting during mentored clinical experiences with adolescent and adult patients. Manage common episodic and chronic conditions at the advanced beginning level, under the supervision of clinical preceptors.
PREREQ: NURS691 and NURS692. COREQ: NURS693. RESTRICTIONS: Open to FNP and AGNP students only.

NURS 695 PRIMARY CARE OF FRAIL/OLDER ADULTS 3
This course prepares the advanced practice nurse for provision of comprehensive, quality, and cost effective care for older adults. Theories of aging, physiology of aging, and the economic, socio-cultural, and ethical aspects of aging will be explored. Students will learn to recognize, evaluate and manage clinical syndromes prevalent in the older adult population. Clinical issues unique to frail/older adults and atypical presentation of disease states will also be explored.
PREREQ: NURS603 NURS694. COREQ: NURS606. RESTRICTIONS: Open to FNP and AGNP students only.
NURS 696  PRIMARY CARE NP PRACTICUM III: SPECIAL POPULATIONS 1-3 PF
The third clinical experience for family and adult-geriatric nurse practitioner students. Knowledge learned in the didactic courses will be applied in the primary care setting during clinical experiences. Learners are encouraged to manage common episodic and chronic conditions at the advanced level, under the supervision of clinical preceptors.
PREREQ: NURS693 and NURS694. COREQ: NURS623, NURS624 and NURS695.
RESTRICTIONS: Open to FNP and AGNP students only.

NURS 810  PHILOSOPHICAL AND THEORETICAL BASIS OF NURSING SCIENCE
Critical analysis of historical, theoretical and philosophical foundations of science in the evolution of knowledge development and inquiry in nursing science. Exploration and analysis of middle-range theory development in nursing science and related health and social science theories.
PREREQ: Admission to PhD in Nursing Science program.

NURS 811  CONCEPTS IN ADVANCED NURSING PRACTICE
Focuses on concepts relevant to advanced nursing practice across the life span. Includes the evaluation of changing nursing practice, environmental influences, cultural determinants on delivery of health care. Emphasis on the responsibility of advanced practitioners for review of current health policies and legislation.
RESTRICTIONS: Requires BSN and permission of instructor.

NURS 812  RESPONSIBLE CONDUCT OF RESEARCH
Critically examines scientific integrity and responsible conduct in biomedical, clinical and translational research within the theoretical and social context of research ethics using case examples and previous experience. Topics include: individual and institutional responsibilities for protecting scientific integrity, protection of the rights of researchers and human and animal subjects, data issues, collaboration, academic integrity, intellectual property, and impact of future developments in science.
PREREQ: Admission to the doctoral program or permission of instructor.

NURS 813  LEADERSHIP AND INNOVATION IN POPULATION HEALTH
Examines theories of leadership and models of change and innovation in healthcare. Gain a systems perspective useful in analyzing the leadership and management needs of healthcare organizations. Examine the key drivers affecting contemporary healthcare delivery. Special emphasis will be placed on developing leaders capable of leading innovation and change in healthcare. May be crosslisted with HLTH813.

NURS 814  ADVANCED QUANTITATIVE RESEARCH IN NURSING SCIENCE
In-depth analysis of quantitative research methodology within the context of research studies or existing data bases. Provides practical experience in collecting, analyzing, and interpreting qualitative and quantitative data. Topics include: formative and summative research questions and hypotheses that are supported by a critical review of the literature and conceptual or theoretical frameworks; examination of quantitative research designs, sampling strategies and sample size estimation; data collection methods and planning for data analysis.
PREREQ: NURS810, NURS812, Doctoral level statistics course or Permission of instructor. COREQ: NURS810, NURS812, Doctoral level statistics course or Permission of instructor.

NURS 816  ADVANCED QUALITATIVE RESEARCH IN NURSING SCIENCE
The naturalistic paradigm, such as ethnography, phenomenology, grounded theory and/or others, are explored. The appropriateness of each approach for exploration, description and explanation of phenomena encountered in clinical, organizational and educational settings is emphasized. Development of a qualitative research proposal.
PREREQ: NURS810 and NURS812.

NURS 818  ADVANCED NURSING SCIENCE
Critical analysis of the foundations of science in the evolution of knowledge development and inquiry in nursing science. Exploration and analysis of the development of middle-range theoretical structures and processes in nursing science and related health and social science theories relative to current and future trends in theory development. Middle-range theory development, application, testing, and evaluation emphasize strategies for using existing nursing and health related theories to foster development of new knowledge.

NURS 833  NURSE SCIENTIST SPECIAL TOPICS SEMINAR I
Students share scholarly discourse with experts in nursing science and health-related research to develop their dissertation research and advance their knowledge of the theoretical, methodological and practical aspects of research and grant writing. The expected behavior and responsibilities of the nurse scientist and academician are integrated.
PREREQ: NURS810, NURS812. COREQ: NURS814 or NURS816.

NURS 834  NURSE SCIENTIST SPECIAL TOPICS SEMINAR II
Students share scholarly discourse on current topics in nursing science and health-related research, advance their ideas for dissertation, and incorporate behavior behavior needed by the nurse scientist for engaging with the local and global scientific community. Builds upon work accomplished in NURS833.
PREREQ: NURS833.

NURS 835  NURSE SCIENTIST SPECIAL TOPICS SEMINAR III
Students share scholarly discourse with experts in nursing science to advance their ideas for dissertation. Strategies for promoting professional development and career trajectory planning are emphasized. Facilitates the socialization process to the nurse scientist role. Builds upon work accomplished in NURS834.
PREREQ: NURS834 or permission of instructor.

NURS 839  NURSE SCIENTIST SEMINAR
Offers opportunities for doctoral students to share scholarly discourse with experts in nursing science and incorporate behavior needed by a nurse scientist for engaging in team science with the local and global scientific community. This course will emphasize scholarly discourse on current topics in nursing science and health-related research and integrate responsibilities of a nurse scientist and academician.
PREREQ: NURS810, and NURS812.

NURS 841  PHILOSOPHICAL AND THEORETICAL BASIS OF NURSING EDUCATION
Critical inquiry into major philosophical positions and associated educational theories relevant to nurses and nursing. Ideas and historical roots which are relevant to contemporary issues in teaching nursing will be explored. Learners will evaluate theories of education used in educational research and develop an awareness of how and why philosophy and theory matters to education and teaching in schools of nursing.
PREREQ: NURS810, NURS814 and NURS816.

NURS 842  NURSING HIGHER EDUCATION: STRUCTURE, PROCESSES & OUTCOMES
Overview of structure and processes in systems of higher education in nursing including but not limited to curriculum development, educational strategies and outcome evaluation of individual students, groups and programs.
PREREQ: NURS810 COREQ: NURS841

NURS 843  POLICY & FINANCE FOR HEALTHCARE DELIVERY
Examines nursing leadership required for population health evaluation and service delivery with a specific focus on policy development and healthcare financing. Gain knowledge needed to position doctorally-prepared nurses to develop, implement and evaluate policies, programs and financing structures to support innovative methods of decreasing rates of disease and increasing wellness to improve population health. May be crosslisted with HLTH843.
PREREQ: NURS810. RESTRICTIONS: For nursing majors only.

NURS 844  POPULATION HEALTH INFORMATICS
Integrates knowledge of healthcare information technology and public health data to support the education of individual and population. Uses technology to support knowledge and life-long learning to improve and development. Focuses on the analysis and application of information technologies that support the provision of care including social context, availability of technology, and structure of information along with legal, regulatory, and ethical concerns. Emerging technologies and contemporary issues are highlighted. May be crosslisted with HLTH844.

NURS 849  NURSING EDUCATION PHILOSOPHY AND CURRICULUM
Involves critical inquiry into major philosophical positions and educational theories relevant to issues in contemporary nursing education. The impact of relevant pedagogies on teaching/learning strategies and outcomes in higher education are explored in light of the structure and processes including curriculum development and evaluation.
PREREQ: NURS810.

NURS 850  DISSERTATION PROPOSAL SEMINAR
PF Students evaluate and refine their dissertation proposal through interactions with peers and faculty. The seminar is facilitated by faculty involved with dissertation committees. Attention is given to University requirements and preparing students for dissertation proposal defense.
PREREQ: Completion of all other PhD courses or permission of instructor. COREQ: Written comprehensive examination or permission of instructor.

NURS 852  INTEGRATED HEALTHCARE DELIVERY I
Focuses on the theoretical and scientific underpinnings of integrated health care delivery with diverse populations across the lifespan, including an emphasis on the wellness-illness continuum. Students will integrate concepts of population health, life course theory, health behavior change, and integrated health care delivery to conceptualize innovative strategies to promote health and minimize disease burden across diverse populations.

NURS 853  INTEGRATED HEALTHCARE DELIVERY II
Focuses on the clinical applications of integrated health care delivery with diverse populations across the lifespan and across the wellness-illness continuum. Using an innovative inter-professional approach, the course directly prepares family nurse practitioners and psychiatric nurse practitioners to promote positive health outcomes in integrated care settings.
PREREQ: NURS852.
NURS 866 SPECIAL PROBLEM 1-12

NURS 868 RESEARCH: SCHOLARLY PROJECT 1-3
Investigation of a problem in clinical settings related to finance, administration, personnel management, public policy or education, resulting in completion of a scholarly project.

NURS 869 MASTER'S THESIS 1-6

NURS 870 WRITING FOR DISSEMINATION 2
Prepare students to successfully disseminate in the form of submitted proposals and published articles in peer-reviewed scientific journals. Provide students with both scholarly and practical knowledge on writing, and submitting proposals and manuscripts. Explore the publishing process as well as techniques for writing clear and well-organized manuscripts and ethical issues involving preparation, submission and publication.
RESTRICTIONS: Permission of instructor.

NURS 872 PSYCHIATRIC MENTAL HEALTH NURSING II 3
Focuses on the development of two modalities of psychiatric skills and treatment. Core concepts of cognitive and group therapy are integrated with specific strategies for behavioral change.
PREREQ: NURS871

NURS 873 DNP PROJECT I: PROBLEM IDENTIFICATION 3
Explore an area of interest related to practice while applying principles of leadership in the review of the literature. A review of available research will identify gaps in evidence. Develop a well-articulated problem statement that will form the basis for project development and implementation.
PREREQ: NURS881 and NURS883. RESTRICTIONS: This course is open to DNP students only.

NURS 874 DNP PROJECT II: PLANNING & DEVELOPMENT 3 PF
Focuses on project planning for evaluation of both the process of the project implementation and the desired health outcomes. Emphasis will be placed on the development of measurable goals for the project and refinement of the project scope. Identify key stakeholders in the agency targeted for project implementation and work with a recognized leader in healthcare delivery, management, or policy.
PREREQ: NURS873. RESTRICTIONS: Open to DNP students only.

NURS 881 POPULATION HEALTH I 3
 Provides an overview of the theoretical and scientific foundations of the clinical prevention and population health (CPPH) framework for delivery of health care. Concepts and methods of epidemiology, demography, disease prevention, genetics, genomics and epigenetics as they relate to population-based practice are addressed. Social determinants of health will be examined within the context of care delivery for individuals and aggregates/population.

NURS 882 POPULATION HEALTH II 3
Addresses major population health challenges both within the US and globally and focuses on systemic barriers to addressing these challenges. Using an evidence-based practice approach and epidemiological principles learned in Population Health I, the course will focus on the strategies to address priority needs. Principles of patient and community engagement that can assist in coordination of care for improvement of health outcomes in various populations are emphasized.
PREREQ: NURS881.

NURS 883 EVIDENCE-BASED PRACTICE I: METHODS 3
Explore methods of qualitative and quantitative research, critical appraisal of evidence and synthesis of the literature related to clinical practice. Analysis of qualitative and quantitative research methods will be emphasized. Models of evidence-based practice (EBP) will be used to critically appraise evidence in order to synthesize knowledge in a specific area of practice.

NURS 886 EVIDENCE-BASED PRACTICE II: TRANSLATION 3
Focuses on the translation of evidence into practice. The use of science-based theories and concepts to assess, enhance healthcare delivery will be emphasized. Major course emphasis will include methods of measurement, data analysis, and evaluation strategies that can be applied to new practice approaches that improve patient outcomes. Healthcare informatics principles will be used to design healthcare information, evaluation, distribution pathways and knowledge delivery methods.
PREREQ: NURS883.

NURS 900 DNP PROJECT III: IMPLEMENTATION 3 PF
Lead implementation of the DNP project in the practice setting under the guidance of the assigned DNP Project Faculty Mentor. Clinical experiences will be directed at monitoring the process of the implementation, making adjustments in the process to ensure success, and collecting data related to both process and health outcomes. Plans for the long-term sustainability of the project, if appropriate, will be refined. Course seminars will provide opportunities for peer review and feedback.
PREREQ: NURS874. RESTRICTIONS: Open to DNP students only.

NURS 910 DNP PROJECT IV: EVALUATION & DISSEMINATION 1 PF
Analysis of outcomes data for the practice change improvement and dissemination of results to the professional community and practice setting. Work closely with their DNP Project Faculty Mentor and other team members. Course seminars will provide opportunities for peer review and feedback during the evaluation and dissemination phase of the DNP project.
PREREQ: NURS900. RESTRICTIONS: Open to DNP students only.

NURS 920 DNP CLINICAL ROLE IMMERSION - POST-MASTERS 1-3 PF
The final clinical course that will allow the student to apply principles of healthcare informatics, health policy, and leadership learned in previous courses in the clinical setting. Explore an area of clinical practice of interest to them that will enhance their ability to function as an advanced practice nurse.
RESTRICTIONS: Open to post-master’s DNP students only.

NURS 921 DNP CLINICAL ROLE IMMERSION - POST-BACCALAUREATE 5 PF
The final clinical course that will prepare the nurse practitioner student for the transition to independent practice. The clinical experience will enable the student to apply knowledge of healthcare informatics, health policy, integrated care, and leadership principles learned in previous courses in the clinical setting. Students will utilize these skills to improve the delivery of the full spectrum of health care services to patients in the primary care and mental health settings.
PREREQ: NURS676 and NURS696. COREQ: NURS696. RESTRICTIONS: Open to post-baccalaureate DNP students only.

NURS 964 PRE-CANDIDACY STUDY 0 PF

NURS 969 DOCTORAL DISSERTATION 1-9 PF
With guidance of dissertation chair, completes independent work on dissertation research.
PREREQ: Completion of all required coursework and successful completion of Comprehensive Exam.

NURS 999 PH.D. SUSTAINING 0 PF

PHILOSOPHY

PHIL 100 PHILOSOPHIES OF LIFE 3
Survey of selected past and present philosophies that people strive to live by, typically including individualistic, group-oriented, religious and nonreligious positions.

PHIL 101 GREAT WESTERN PHILOSOPHERS 3
Survey of the key ideas of great Western philosophers concerning the nature of reality and how it is known. Focus on individual philosophers such as Plato, Aristotle, Descartes, Kant, Hegel, James, and Wittgenstein.

PHIL 102 INTRODUCTION TO PHILOSOPHY 3
An examination of such central philosophical problems as ethics, theories of knowledge, the nature of reality, philosophy of religion and political philosophy.

PHIL 105 CRITICAL THINKING 3
Emphasis on developing skill at logical criticism of arguments. Topics include informal fallacies, deceiving with statistics, the role of definitions in reasoning, the importance of evidence and confirmation.

PHIL 115 PHILOSOPHY FIRST YEAR SEMINAR 0 PF
Meet four different philosophy professors for one hour each to discuss different areas of philosophy. Times arranged to fit student schedules.
RESTRICTIONS: For incoming philosophy majors.

PHIL 125 TOPICS: PHILOSOPHY IN POPULAR CULTURE 1-4
Philosophical ideas expressed in popular media such as science fiction or fantasy literature, films and music. Topics are variable.
RESTRICTIONS: May be repeated for up to four credit hours.
PHIL 200  **BUSINESS ETHICS**  3
Ethical theory applied to moral problems in business. Corporate social responsibility, and ethical issues in advertising, personnel and investment.

PHIL 201  **SOCIAL AND POLITICAL PHILOSOPHY**  3
Classical and contemporary views on such problems as the proper scope and functions of government, what a just distribution of wealth is, and on the extent of an individual’s rights, liberties and obligation to obey the law.

PHIL 202  **CONTEMPORARY MORAL PROBLEMS**  3
The application of philosophical techniques to contemporary moral problems such as abortion, punishment, biomedical ethics, reverse discrimination and sexual morality. May be crosslisted with WOMS203.

PHIL 203  **ETHICS**  3
Study of moral value, moral obligation and moral virtue through comparison of notable schools of ethical theory, including utilitarianism, existentialism, Kantianism, classical Greek eudaemonism, pragmatism and Thomism.

PHIL 204  **WORLD RELIGIONS**  3
Varieties of religious belief and practice from diverse cultures, including representative Asian and Western traditions, studied mainly in terms of their historical development and importance.

PHIL 205  **LOGIC**  3
Concepts and techniques of elementary symbolic logic: truth and consistency of sentences, validity and soundness of arguments; translation of English sentences into a formal language, construction of truth tables and the use of a system of natural deduction to prove the validity of deductive arguments.

PHIL 207  **SCIENTIFIC REASONING**  3
Critical survey of basic concepts and forms of inductive reasoning. Applications to the physical, social and biomedical sciences. Topics include: interpretations of probability, probabilistic fallacies, methods of statistical induction, logic of hypothesis testing, judging correlations, criteria of causation, experimental design and definitions of confirmation.

PHIL 208  **INTRODUCTION TO JEWISH PHILOSOPHY**  3
Fundamental issues in philosophy of religion reflecting both general theological approaches to resolving the tension between philosophy and religion and the uniquely Jewish attempt to do so. Topics include: God, miracles, good and evil, divine commandments and free will. May be crosslisted with JWST208.

PHIL 209  **PHILOSOPHY OF RELIGION**  3
Religious experience, proofs for God’s existence, religious language and critiques of religion. Selected special topics such as mysticism, evil, atheism, miracles, immortality and myth.

PHIL 210  **WOMEN AND RELIGION**  3
Explores the relationship between sacred text and women’s religious and societal roles within Christianity, Judaism, Islam, Hinduism and Buddhism during diverse historical moments. Examine the experience of women operating within the confines of their various traditions as well as consider those who pushed the boundaries of their faith communities. Utilize a variety of feminist approaches to the study of religion. Crosslisted with WOMS210.

PHIL 211  **BASIC DECISION THEORY**  3
Rational decision-making using only elementary logic and high-school algebra. Decisions under ignorance: max-min rules for preference orderings. Decisions under risk: probability, utility, and the expected utility rule. Game theory: equilibrium strategies; prisoner’s dilemma. Social choices: voting paradoxes and Arrow’s theorem.

PHIL 216  **INTRODUCTION TO FEMINIST THEORY**  3
This course explores the various theoretical explanations for and solutions to gender inequality. The development of feminist theory will be presented as an intellectual history placing each theoretical framework in conversation with the others covered during the course of the semester. Students will become familiar with a variety of feminist theories including: liberal, Marxist, socialist, transnational, radical, homosexual, multicultural, psychoanalytic, cultural, standpoint, social construction, multietnic/racial, postmodern, and queer. Our understanding of these theoretical perspectives will be aided by the inclusion of current case studies and class debates. Crosslisted with WOMS216.

PHIL 226  **MIND, ESP AND SURVIVAL**  3
An exploration of major philosophical conceptions of the relation of mind (soul) and brain. Implications for the nature of mind from the literature of psychic research and immortality.

PHIL 241  **ETHICAL ISSUES IN HEALTHCARE**  3
Interdisciplinary study of ethical thought and its application to contemporary medicine, with a focus on ethical challenges in the provision and distribution of healthcare. Consideration of such issues as whether there is a right to health care, personal responsibility for ill health, and healthcare rationing.

PHIL 244  **PHILOSOPHY OF ART**  3
An introduction to main philosophic problems concerning art: the nature, evaluation and value of art.

PHIL 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.

PHIL 301  **ANCIENT PHILOSOPHY**  3
Beginnings of Western science and philosophy. The pre-Socratics, Sophists, Socrates, Plato, Aristotle, the Epicureans, Stoics and Skeptics.

PHIL 303  **MODERN PHILOSOPHY**  3
Scepticism and the birth of Modernity. Bacon and scientific experimentalism; Hobbes materialism, Descartes, Spinoza and Leibniz; Locke, Berkeley, Hume and Kant; and the Age of Enlightenment and its impact on philosophy, science and religion.

PHIL 304  **NINETEENTH-CENTURY PHILOSOPHY**  3
Major philosophies of the 19th century with special emphasis on Hegel and Nietzsche.

PHIL 305  **TWENTIETH-CENTURY PHILOSOPHY**  3
Major philosophical movements from the 20th century to the present. Includes logical empiricism and the recent criticism of this movement.

PHIL 306  **PHILOSOPHY OF SCIENCE**  3
A survey of central topics in the philosophy of science which may include the distinction between science (astronomy) and pseudo-science (astrology), the role of values in science, scientific realism, scientific reductionism, as well as the nature of scientific theories, explanations, and confirmation.

PHIL 307  **BLACK THOUGHT AND PHILOSOPHY**  3
Readings and discussions of Black philosophies, ideologies and concepts as reflected in the thought of significant Black figures. May be crosslisted with BAMS307.

PHIL 308  **TOPICS IN JEWISH THEOLOGY**  3
Critical evaluation of the theological views of major branches of Judaism on such topics as: the significance of Israel, the status of Jewish law, the meaning of Jewish ritual and the mission of the Jewish people. May be crosslisted with JWST308. PREREQ: PHIL208 recommended.

PHIL 309  **INDIAN RELIGION AND PHILOSOPHY**  3
The Vedas, Upanishads, and Bhagavad-Gita; Sankhya, Yoga, Nyaya, Vaisheshika and Mimamsa; Jainism and Indian Hinayana and Mahayana Buddhism; Vedanta and modern developments such as Aurobindo.

PHIL 310  **CHINESE RELIGION AND PHILOSOPHY**  3

PHIL 311  **EARLY MEDIEVAL PHILOSOPHY**  3
Examines the attempt to synthesize Greek philosophy with biblical religion in the late classical and early medieval period. Covers Plotinus, Augustine, Anselm and Abelard among others, on topics including God, scepticism, evil, the happy life, universals and more.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>PHIL 312</td>
<td>LATE MEDIEVAL PHILOSOPHY</td>
<td>3</td>
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<tr>
<td>PHIL 313</td>
<td>KILLING AND LETTING DIE</td>
<td>3</td>
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<td>PHIL 315</td>
<td>METAPHYSICS</td>
<td>3</td>
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<td>PHIL 316</td>
<td>TIME TRAVEL</td>
<td>3</td>
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<tr>
<td>PHIL 317</td>
<td>AMERICAN PHILOSOPHY</td>
<td>3</td>
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<tr>
<td>PHIL 320</td>
<td>THEORY OF KNOWLEDGE</td>
<td>3</td>
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<tr>
<td>PHIL 322</td>
<td>EXISTENTIALISM</td>
<td>3</td>
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<td>PHIL 327</td>
<td>RACE, GENDER, SCIENCE</td>
<td>3</td>
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<td>PHIL 330</td>
<td>PHILOSOPHY OF MIND</td>
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<td>PHIL 335</td>
<td>BUDDHIST PHILOSOPHY</td>
<td>3</td>
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<td>PHIL 337</td>
<td>DAOIST THOUGHT</td>
<td>3</td>
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<td>PHIL 340</td>
<td>CROSS CULTURAL ENVIRONMENTAL ETHICS</td>
<td>3</td>
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<td>PHIL 341</td>
<td>ETHICS OF ENGINEERING PROFESSION</td>
<td>1</td>
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<tr>
<td>PHIL 344</td>
<td>SCIENCE AND RELIGION</td>
<td>3</td>
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<td>PHIL 366</td>
<td>INDEPENDENT STUDY</td>
<td>1-6</td>
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<tr>
<td>PHIL 389</td>
<td>TOPICS: WOMEN AND HEALTH ISSUES</td>
<td>3</td>
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<td>PHIL 390</td>
<td>HONORS COLLOQUIUM</td>
<td>3</td>
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<tr>
<td>PHIL 404</td>
<td>ANIMAL MINDS</td>
<td>3</td>
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<td>PHIL 410</td>
<td>RELIGION AND PSYCHOLOGY</td>
<td>3</td>
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<td>PHIL 418</td>
<td>MEANING AND LANGUAGE USE</td>
<td>3</td>
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<tr>
<td>PHIL 421</td>
<td>PHILOSOPHY, BIOLOGY, SOCIETY</td>
<td>3</td>
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<tr>
<td>PHIL 444</td>
<td>MEDICAL ETHICS</td>
<td>3</td>
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<td>PHIL 446</td>
<td>PHILOSOPHY OF LAW</td>
<td>3</td>
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<td>PHIL 448</td>
<td>ENVIRONMENTAL ETHICS</td>
<td>3</td>
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<tr>
<td>PHIL 450</td>
<td>RECENT TOPICS IN PHILOSOPHY OF MIND</td>
<td>3</td>
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<td>PHIL 463</td>
<td>ETHICAL THEORY</td>
<td>3</td>
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<tr>
<td>PHIL 465</td>
<td>SENIOR SEMINAR</td>
<td>3</td>
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</table>

**PHIL 312 LATE MEDIEVAL PHILOSOPHY**
The rediscovery of Aristotle by the Islamic philosophers (10th-12th centuries) through Ockham (14th century) and includes Avicenna, Alzazali, Averroes, Maimonides, Aquinas, and more. Topics include science and religion, divine command theory, talking about God, among others.

**PHIL 313 KILLING AND LETTING DIE**
Examines the moral basis for condemning killing while allowing, or even applauding, letting die.

**PHIL 315 METAPHYSICS**
Examination of central issues in metaphysics. Sample topics: universals and particulars, possibility and necessity, identity over time, free will, causality, and the philosophy of time.

**PHIL 316 TIME TRAVEL**
Through philosophy applied to physics and science fiction, explores the connections of time travel to traditional philosophic issues concerning the nature of time, God, free will and personal identity.

**PHIL 317 AMERICAN PHILOSOPHY**
Classical American philosophers, including Emerson, Thoreau, Peirce, James and Dewey. Includes ethics, epistemology and social and political theory.

**PHIL 320 THEORY OF KNOWLEDGE**
An examination of some central issues in epistemology: classical and contemporary analyses of empirical knowledge; the nature of justification and rationality; implications for science, religion and metaphysics.

**PHIL 322 EXISTENTIALISM**
Study of the origins and development of existential philosophy. Emphasis on the fundamental insight into the nature of man that separates the existentialists from the rest of the Western philosophical tradition. Sources include Pascal, Kierkegaard, Nietzsche and Sartre.

**PHIL 327 RACE, GENDER, SCIENCE**
Critically examines a number of metaphysical, epistemological, and ethical issues related to science of race, gender, and sexual orientation. Topics may include: (a) evolution of sex and gender, (b) gender and cognition, (c) biological basis, or lack thereof, of sexual orientation/ preference (d) evolutionary, cognitive, historical, and political origins of race thinking, (e) relationship between everyday conceptions of race and gender as compared with scientific conceptions of race and gender, (f) ethical issues raised by human kind classification schemes.

**PHIL 330 PHILOSOPHY OF MIND**
Coverage of central issues in the philosophy of mind including such topics as the relation between mind and body, the nature of thought, consciousness, perception, personal identity and the relation of cognitive psychology, neuroscience and computer science to the philosophy of mind. May be crosslisted with GSOC330.

**PHIL 335 BUDDHIST PHILOSOPHY**
Examine the variety of philosophical positions and methodologies to be found amongst the Buddhist traditions in India, China, Japan, and Tibet. Explore mostly primary materials, and articulate the complexity and diversity of these rich traditions of philosophical and psychological analysis.

**PHIL 337 DAOIST THOUGHT**
Examine seminal primary and secondary works representative of the various Daoist traditions in Chinese culture. This includes philosophical Daoism, but also religious and spiritual Daoism as well. Emphasis placed on recent discoveries which have called into question many of the prevailing understandings of classical Daoist thought, such as the discovery of early manuscripts buried in tombs, and the connections between early Chinese religious traditions and mature Daoist philosophies.

**PHIL 340 CROSS CULTURAL ENVIRONMENTAL ETHICS**
Critical and global study of the ethics of human-environment relations as suggested by the science of ecology, Western philosophy, physical science, the world views of Judaism, Christianity, Islam, Hinduism, Buddhism, Taoism, Native American traditions, African traditions ecocentrism and American law.

**PHIL 341 ETHICS OF ENGINEERING PROFESSION**
Introduction to cases involving engineers' moral responsibilities; emphasis on making reasonable ethical choices.

**PHIL 344 SCIENCE AND RELIGION**
Examines the relationship between science and religion and focuses on: whether our current cosmological picture of the Big Bang allows for a Creator; the rationality of miracle-reports; whether the scientific image of humanity is compatible with a religious worldview; the biological evolution/creation debate. May be crosslisted with SCEN344.

**PHIL 366 INDEPENDENT STUDY**
Topics vary. May be repeated for credit when topics vary.

**PHIL 389 TOPICS: WOMEN AND HEALTH ISSUES**
Varying special topics related to women's health. Topics may include, but are not limited to: the relationship between women, health and development; theoretical contributions of feminism to thinking about relationship between gender and health; women’s health conditions in various parts of the world. Crosslisted with WOMS389. PREREQ: Any WOMS 200-level course.

**PHIL 390 HONORS COLLOQUIUM**
Topics vary. May be repeated for credit when topics vary.

**PHIL 404 ANIMAL MINDS**
Examines philosophical, theoretical, and methodological issues raised by study of animal cognition and behavior. Topics may include mental continuity between human and nonhuman animals, animal communication and deception, self-recognition, emotions, culture, as well as the ethical treatment of animals. Crosslisted with GSOC404.

**PHIL 410 RELIGION AND PSYCHOLOGY**
Explore religion from various psychological points of view, on the one hand, and psychology from various religious points of view. Examine authors which blur the distinctions between these three approaches. We will not be attempting to reduce religious experience to one or another normal or abnormal psychological state. Explore how religious experiences can be viewed as real experiences for which one should be able to provide a psychological account. May be crosslisted with PSYC410.

**PHIL 418 MEANING AND LANGUAGE USE**
Introduction to theories of meaning based on the notion of truth and their application to language. Crosslisted with LING418. PREREQ: LING101.

**PHIL 421 PHILOSOPHY, BIOLOGY, SOCIETY**
Recent topics in philosophy of biology, with emphasis on those related to self, community, and society at large. Topics may include intelligent design, evolutionary altruism, psychological altruism, evolutionary psychology, cultural evolution, evolutionary game theory, and evolutionary ethics. Crosslisted with GSOC421.

**PHIL 444 MEDICAL ETHICS**
Seminar focuses on such topics as experimentation with human subjects, genetic engineering and the moral problems of health care. RESTRICTIONS: For students of philosophy and health professions.

**PHIL 446 PHILOSOPHY OF LAW**
Explores basic topics in the philosophy of law (e.g., the nature of law, constitutional and statutory interpretation, theories of criminal punishment), as well specific controversial issues concerning the law.

**PHIL 448 ENVIRONMENTAL ETHICS**
Ethical problems associated with environmental protection, local, national, and international. Relations to social and political movements. Seminar format. May be crosslisted with UAPP448.

**PHIL 450 RECENT TOPICS IN PHILOSOPHY OF MIND**
Recent topics in the philosophy of mind such as theory of mind, naturalized semantics, animal cognition, evolution of language. May be crosslisted with GSOC450.

**PHIL 463 ETHICAL THEORY**
Justification of ethical beliefs, alternative criteria of moral rightness and the meaning of moral concepts. PREREQ: PHIL202 or PHIL203.

**PHIL 465 SENIOR SEMINAR**
Various authors and themes; e.g., Plato, Kant, epistemology, philosophy of mind. RESTRICTIONS: Open only to Philosophy Majors and by permission of instructor. May be repeated once for credit when topics vary.
<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>PHYS 604</td>
<td>Animal Minds</td>
<td>3</td>
<td>Examines philosophical, theoretical, and methodological issues raised by study of animal cognition and behavior. Topics may include mental continuity between human and nonhuman animals, animal communication and deception, self-recognition, emotions, culture, as well as ethical treatment of animals. Crosslisted with CGSC604.</td>
</tr>
<tr>
<td>PHYS 613</td>
<td>RAISE: Research Ethics</td>
<td>0-3 PF</td>
<td>The RAISE (Responsibility and Integrity in Science and Engineering) seminar provides graduate instruction on research ethics and professional practice. The seminar prepares participants as future leaders of professional integrity in their fields. Issues include attribution of authorship, data falsification, conflicts of interest, plagiarism, and whistleblowing. May be crosslisted with UNIV613. RESTRICTIONS: Consent of instructor.</td>
</tr>
<tr>
<td>PHYS 648</td>
<td>Environmental Ethics</td>
<td>3</td>
<td>Ethical problems associated with environmental protection, local, national, and international. Relations to social and political movements. Seminar format. May be crosslisted with MAL5648, UAP6448.</td>
</tr>
<tr>
<td>PHYS 650</td>
<td>Recent Topics in the Philosophy of Mind</td>
<td>3</td>
<td>Recent topics in the philosophy of mind such as theory of mind, naturalized semantics, animal cognition, evolution of language.</td>
</tr>
<tr>
<td>PHYS 815</td>
<td>Ethics, Business and Communication</td>
<td>3</td>
<td>Provides professional development in ethics, business and communication related to systems biology research applications in stem cell, tissue engineering, and drug delivery technologies. Intended for PhD students in interdisciplinary life science and engineering programs. Crosslisted with BINF815.</td>
</tr>
<tr>
<td>PHYS 868</td>
<td>Research</td>
<td>1-3</td>
<td>A detailed study of certain philosophical problems with special reference to research problems under way in the department.</td>
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**PHYSICS AND ASTRONOMY**

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<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>PHYS 133</td>
<td>Introduction to Astronomy</td>
<td>4</td>
<td>Objects of the universe from the earth to galaxies. How the universal laws that govern them; e.g., gravity and electromagnetic radiation, permit us to learn their nature from quantitative observations. Telescopic observations, visual and electronic, included in the laboratory. RESTRICTIONS: Not for credit for those who have taken PHYS144.</td>
</tr>
<tr>
<td>PHYS 139</td>
<td>Star and Constellation Identification</td>
<td>1</td>
<td>Familiarity with the sky, its changing aspects, constellations, mythology, bright stars, and planets. Topics include use of sky maps and coordinates, how to estimate directions and time from knowledge of the sky, and the use of binoculars and small telescopes.</td>
</tr>
<tr>
<td>PHYS 141</td>
<td>Light, Lasers, Cameras, Perception</td>
<td>3</td>
<td>Introduction to the phenomena of light, optics and perception for non-science majors. Topics include: nature of light, sources of light and shadows, rainbows, mirages and other atmospheric phenomena, cameras, telescopes, microscopes, color creation and observation, physics influences in art, the human eye and perception.</td>
</tr>
<tr>
<td>PHYS 143</td>
<td>Energy Technology and Society</td>
<td>3</td>
<td>Basic principles of physics are applied to discuss forms of energy (mechanical, thermal, chemical, electrical and nuclear), and how energy is derived from sources such as coal, petroleum, solar, nuclear fission and fusion. Environmental consequences of energy use are treated. PREREQ: College algebra.</td>
</tr>
<tr>
<td>PHYS 144</td>
<td>Concepts of the Universe</td>
<td>3</td>
<td>Survey of astronomy emphasizing early and modern concepts. Stars, planets, galaxies, cosmic evolution and intelligent life are studied in the context of physical principles which describe the dynamics of the universe. Scientific process is used to interpret observations that shape our perceptions of the cosmos. RESTRICTIONS: Not for credit to students who have taken PHYS133.</td>
</tr>
<tr>
<td>PHYS 145</td>
<td>Black Holes and Cosmic Evolution</td>
<td>3</td>
<td>Geared toward a general audience and focuses on topics such as finding black holes in space; the nature of space, time and black holes; the origin of the Universe; and the development of complex life here on Earth.</td>
</tr>
<tr>
<td>PHYS 146</td>
<td>Quarks, Gluons, and the Big Bang: Particles and Cosmology</td>
<td>3</td>
<td>Non-mathematical course focusing on the elementary particles and their influence on the early evolution of the universe. Major topics are quarks and the forces they feel, Einstein’s theory of relativity, Quantum Mechanics made fairly simple, and the Inflationary Universe. RESTRICTIONS: Requires high school algebra.</td>
</tr>
<tr>
<td>PHYS 169</td>
<td>Perspectives on Physics and Astronomy</td>
<td>1 PF</td>
<td>First year seminar providing introduction to the practice of physics and astronomy. Topics include research, education, careers, and the relation of physics to society. RESTRICTIONS: Priority given to first year students. Intended for physics and astronomy majors.</td>
</tr>
<tr>
<td>PHYS 201</td>
<td>Introductory Physics I</td>
<td>4</td>
<td>First course in a sequence with PHYS202 that provides an introduction to physics for students in the life and environmental sciences. Introduction to concepts of force, energy, and momentum, with examples of linear, rotational, and oscillatory motion. Solid body and fluid mechanics. PREREQ: MATH115 or MATH117 or MATH221 or MATH 241. RESTRICTIONS: Requires a strong mathematics background in geometry, algebra and trigonometry. Only one course among PHYS201, PHYS207 and SCEN101 can count toward graduation.</td>
</tr>
<tr>
<td>PHYS 202</td>
<td>Introductory Physics II</td>
<td>4</td>
<td>Second course in a sequence with PHYS201 that provides an introduction to physics for students in the life and environmental sciences. Topics include wave motion, electricity and magnetism, and optics. PREREQ: PHYS201 or PHYS207. Only one course from PHYS202 and PHYS208 can count toward graduation.</td>
</tr>
<tr>
<td>PHYS 207</td>
<td>Fundamentals of Physics I</td>
<td>4</td>
<td>First course in a sequence with PHYS208 that provides an introduction to physics for those in physical sciences and engineering. Emphasis on Newton's laws of motion and conservation principles. These are applied to motion in a gravitational field, and to rotation of a rigid body. Integrates conceptual understanding with extensive problem solving and laboratory experience. COREQ: MATH241. RESTRICTIONS: One year of high school calculus is recommended. Only one course from PHYS201, PHYS207 and SCEN101 can count toward graduation.</td>
</tr>
<tr>
<td>PHYS 208</td>
<td>Fundamentals of Physics II</td>
<td>4</td>
<td>Second course in a sequence with PHYS207 that provides an introduction to physics for those in the physical sciences and engineering. Emphasis on electro- and magnetostatics and statistics in terms of forces, fields and potentials, with some elements of circuit theory. Furthermore, magnetic induction and Maxwell's equations in integral form are introduced. Integrates conceptual understanding with extensive problem solving and laboratory experience. PREREQ: PHYS207, MATH241 COREQ: MATH242.</td>
</tr>
<tr>
<td>PHYS 211</td>
<td>Oscillations and Waves</td>
<td>3</td>
<td>Builds on and extends concepts of classical physics introduced in PHYS207. Explores simple harmonic oscillation, the damped harmonic oscillator and forced and coupled oscillations. Provides a simple treatment of traveling and standing waves, reflection of waves at discontinuities as well as interference and diffraction. PREREQ: PHYS207, MATH241. COREQ: MATH242.</td>
</tr>
<tr>
<td>PHYS 245</td>
<td>Introduction to Electricity and Electronics</td>
<td>4</td>
<td>This course provides an introduction to electricity and magnetism. The pertinent fundamental concepts are then applied to DC and AC circuit analysis and the study of electric motors and actuators. The course also provides a brief introduction to sensors and transducers, and electronic amplifiers. PREREQ: PHYS207 COREQ: MATH243 RESTRICTIONS: Not for major credit.</td>
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<tr>
<td>PHYS 266</td>
<td>Special Problem</td>
<td>1-3</td>
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<tr>
<td>PHYS 309</td>
<td>Physics of the Twentieth and Twenty-First Centuries</td>
<td>3</td>
<td>Fundamentals in physics that help form a modern understanding of science and technology. Intended for physical science and engineering majors, the emphasis is on electromagnetic radiation, quantum mechanics, nuclear reactions, Bohr atom, solid state physics and devices, and special relativity. PREREQ: PHYS208 or PHYS245 and MATH242. COREQ: MATH243.</td>
</tr>
<tr>
<td>PHYS 310</td>
<td>Introduction to Thermal Physics</td>
<td>3</td>
<td>General overview of thermal phenomena. Provides detailed treatment of the First Law of Thermodynamics. Introduces concepts of micro- and macro-states, and entropy and the Second Law are treated within a statistical context. First and second laws are applied to power and refrigeration cycles. The concept of free energies and their connection to phase transitions is developed. Finishes with brief introduction to Boltzmann factor and partition function. PREREQ: PHYS207 and MATH 242.</td>
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</tbody>
</table>
PHYS 311 ASPECTS OF MODERN PHYSICS 3
Continuation of PHYS309. The course covers basic solid state physics, nuclear physics, and introductions to elementary particle physics, general relativity and cosmology.
PREREQ: PHYS309

PHYS 313 PHYSICAL OPTICS 4
A detailed treatment of optics at an intermediate level appropriate for physics engineering and other students with a physical science background. Emphasis is on physical concepts and analysis of geometric optics, wave optics and applications of optics.
PREREQ: PHYS208 or PHYS245. COREQ: MATH243.

PHYS 333 FUNDAMENTALS OF ASTROPHYSICS 3
A quantitative approach to astronomy and astrophysics. Treatment of stars, the interstellar medium, galaxies, and cosmology.
PREREQ: PHYS208 or PHYS245, MATH243.

PHYS 366 INDEPENDENT STUDY 1-3

PHYS 419 CLASSICAL MECHANICS I 3
PREREQ: PHYS207, PHYS208 and MATH243. COREQ: MATH302 or MATH341, MATH303 recommended.

PHYS 424 QUANTUM MECHANICS I 3
First in a sequence with PHYS425 that provides introduction to basic principles and applications of quantum mechanics. Emphasis on approximation methods with illustrative applications. Topics include: time-independent and time-dependent perturbation theory, variational principle, WKB approximation, and introduction to scattering. Applications of quantum mechanics to modern physics and technology discussed.
PREREQ: PHYS424.

PHYS 431 ACOUSTICS 3
Vibrations of particles, strings and membranes; acoustic waves; radiation of sound; room acoustics; and acoustic measurements.
PREREQ: MATH243 and PHYS207

PHYS 434 ASTROPHYSICS AND THE ORIGINS OF LIFE 3
Develops fundamental concepts of astronomy, physics, chemistry, and biology in order to identify life that may have helped life to originate in the young Earth, and to determine other environments in which those conditions might have occurred in the course of planetary evolution. Attention paid to (1) current cosmology; (2) generation of chemical elements necessary for life; (3) basics of chemistry prior to appearance of life; (4) steps in molecular evolution which could have led to cellular life; and (5) identification of most extreme conditions in which life known to exist, with a survey of where these conditions may arise in solar system and beyond.
PREREQ: PHYS207 and PHYS208 or PHYS201 and PHYS202

PHYS 445 ELECTRONICS FOR SCIENTISTS 4
Fundamentals of analog and digital electronics, with emphasis on applications in science. Circuit analysis, operational amplifiers, filters, gates, flip-flops, counters, analog to digital and digital to analog converters.
PREREQ: PHYS208 or PHYS245.

PHYS 446 INSTRUMENTATION FOR SCIENTISTS 4
Electronic measurements and instrumentation with emphasis on applications in science. Amplification, noise, low-level signal recovery, lock-in amplifiers, digital signal averaging, frequency and time measurements, transducers, bridges, interfacing to laboratory computers and automation of experiments.
PREREQ: PHYS208 or PHYS245.

PHYS 460 COMPUTATIONAL METHODS OF PHYSICS 3
Introduction to basic computational techniques in science with application to a number of disciplines of current research interest, such as quantum physics, biophysics, statistical mechanics and chaos.
PREREQ: MATH302 or MATH341, CISC106 or equivalent, PHYS208 or PHYS245.

PHYS 465 SENIOR SEMINAR 1
Senior seminar for physics majors.

PHYS 466 INDEPENDENT STUDY 1-3

PHYS 468 INTRODUCTION TO RESEARCH 1-6
Undergraduate research on an assigned problem carried out under supervision of the faculty.

PHYS 469 OBSERVATIONAL ASTRONOMY 3
Hands-on experience focusing on techniques and analysis of astronomical observation, with emphasis on CCD imaging. Topics include celestial coordinates, telescope handling, CCDs, data reduction, and data analysis.
RESTRICTIONS: Meets at Mt. Cuba Observatory in Greenville. Credit can only be received for either PHYS469 or PHYS569, not for both.

PHYS 480 HISTORY OF PHYSICS 3
Survey of the development of physical ideas, from observations of the heavens and calculations of planetary positions by the ancient Egyptians, Babylonians, and Greeks, and the development of natural philosophy, to the revolutionary discoveries from the 16th century onward by Galileo, Newton, Einstein, etc. Attention to individual contributions by scientists from a wide variety of geographical and ethnic backgrounds, and to international collaborations on large scientific projects in the modern period.
PREREQ: PHYS207, PHYS208, PHYS309.

PHYS 511 TOPICS IN HIGH SCHOOL PHYSICS: FORCE, MOTION AND ENERGY 3
Application of physics principles to topics related to Newton’s Three Laws, work and mechanical energy.
RESTRICTIONS: Restricted to in-service high school science teachers.

PHYS 600 RESEARCH AND PRESENTATION SKILLS 1 PF
Introduction to a range of transferable skills important for successful communication in science, research and in other professional areas. Develop a wider understanding of the context in which research takes place through critical reading and evaluation of a wide range of literature. Required to read and assimilate, and produce a critical report of the literature in a specific research area in the form of a talk or a poster.

PHYS 601 INTRODUCTION TO TEACHING PHYSICS AND ASTRONOMY 1 PF
Introduction to the methods and techniques of teaching and tutoring physics at a level appropriate for teaching assistants and tutors of undergraduate courses in Physics and Astronomy. Discussion and workshop formats are employed.

PHYS 603 ELECTRICITY AND MAGNETISM I 3
First of a two-part sequence (with PHYS604) that provides an intermediate level treatment of electrodynamics and magnetostatics, as well as an introduction to electrodynamics. Topics include a discussion of different techniques used for the calculation of electrostatic and magnetostatic fields in vacuum and in matter, and effects of time varying electric and magnetic fields.
PREREQ: PHYS208, MATH302 or MATH341.

PHYS 604 ELECTRICITY AND MAGNETISM II 3
Second in a two-part sequence (with PHYS603) that provides an intermediate level treatment of electrodynamics. Specific topics include a discussion of conservation laws, electromagnetic waves and radiation, and the theory of special relativity.
PREREQ: PHYS603

PHYS 607 METHODS OF MATHEMATICAL PHYSICS 3
Mathematics commonly used in physics. main topics are linear algebra, vector calculus, fourier series, integral transforms, and eigenfunction methods for differential equations.

PHYS 608 METHODS OF MATHEMATICAL PHYSICS 3
Continuation of PHYS607. Main topics are partial differential equations, complex variables, tensors, calculus of variations, group theory and representation theory, and probability and statistics.
PREREQ: PHYS607

PHYS 610 QUANTUM MECHANICS 3
PHYS 616  STATISTICAL PHYSICS AND THERMODYNAMICS  3
May be crosslisted with ELEG616.

PHYS 620  CLASSICAL MECHANICS II  3
Topics covered are Lagrangian and Hamiltonian dynamics, dynamics of systems of particles, rigid bodies and fluids, oscillations of systems of coupled particles, oscillations and waves in continuous systems. Provides a classical introduction to techniques used extensively in quantum and statistical physics.

PHYS 624  INTRODUCTION TO CONDENSED MATTER PHYSICS  3
X-ray diffraction, structure and properties of metals, insulators and semiconductors, and band theory of solids; includes electrical, optical, magnetic and thermal properties.
RESTRICTIONS: Some knowledge of statistical physics and thermodynamics is recommended.

PHYS 626  INTRODUCTION TO ATOMIC, MOLECULAR AND OPTICAL PHYSICS  3
Introduction to fundamental atomic and molecular systems with emphasis on modern topics including recent advances in laser physics, quantum computing, Bose-Einstein condensation, and molecular structures.
PREREQ: PHYS 424 and PHYS 5603.

PHYS 630  GALAXIES  3
Addresses the structure, formation, and evolution of galaxies as building blocks of the universe. Emphasizes using the laws of physics to interpret observational data and recent discoveries in the field.
PREREQ: PHYS 333.

PHYS 632  ASTROPHYSICS  3
Survey of diverse astronomical objects and the physical principles used in modeling them. Emphasis on the observational basis and foundations of astrophysics. Stellar magnitudes, colors and spectra; the HR diagram; solar and stellar activity; binary stars; the phenomena of galactic and extragalactic astronomy.

PHYS 633  INTRODUCTION TO STELLAR ASTROPHYSICS  3
Introduction to the physics of stellar interiors and atmospheres. The evolution of stars is explored by studying the changes in internal composition due to nuclear reactions. The physical processes underlying stellar spectra are investigated. Computer simulations of stars and their atmospheres may be used.

PHYS 634  PHYSICS OF THE SUN  3
Physics of processes which occur in the outer regions of the sun. Topics include radiative transfer, convection, sound waves, magnetic fields, the chromosphere, the corona, the solar wind, and the cycle of solar activity.
PREREQ: PHYS 333 or PHYS 563.

PHYS 635  SPACE PHYSICS  3
Introduction to physical processes and environments in our solar system. Topics include overview of plasma physics, magnetohydrodynamics, and turbulence theory; properties of solar wind; planetary magnetospheres; cosmic ray transport and acceleration; experimental and observational techniques; solar weather and its impact on human activities.
PREREQ: PHYS 5603.

PHYS 638  SELECTED TOPICS IN PHYSICS  3
Treatment of a specialized subject taken from the following list: magnetic materials, electron microscopy, elementary particles, and other advanced topics.
RESTRICTIONS: May be repeated for credit when topics vary.

PHYS 639  SELECTED TOPICS IN ASTROPHYSICS  3
Treatment of a specialized topic in astrophysics such as stellar winds, particle astrophysics, brown dwarfs, extra-solar planets, gamma-ray astronomy, and other advanced topics.
RESTRICTIONS: May be repeated for credit when topics vary.

PHYS 641  NANOMATERIALS AND THIN FILM PROCESSES  3
Includes physical and chemical vapor deposition processes. Topics selected from Vacuum Science and Technology, Thin-Film Deposition Processes, Discharges, Plasmas, Ion-Surface Interactions, Chemical Vapor Deposition, Laser Ablation, Substrate Surfaces and Thin-Film Nucleation, Epitaxy, Film Structure, Characterization of Thin Films and nanostructures, etc. May be crosslisted with MSEG641.

PHYS 644  ELEMENTARY PARTICLES AND BIG BANG COSMOLOGY  3
An introduction to the world of elementary particles, the fundamental building blocks of matter, and the essential role they play in the formulation of hot big bang and inflationary cosmologies.
PREREQ: Some knowledge of quantum mechanics and special relativity is recommended.

PHYS 645  ELECTRONICS FOR SCIENTISTS  4
Fundamentals of analog and digital electronics, with emphasis on applications in science. Circuit analysis, operational amplifiers, filters, gates, flip-flops, counters, analog to digital and digital to analog converters.
PREREQ: PHYS 208 or PHYS 245.

PHYS 646  INSTRUMENTATION FOR SCIENTISTS  4
Electronic measurements and instrumentation with emphasis on applications in science. Amplification, noise, low-level signal recovery, lock-in amplifiers, digital signal averaging, frequency and time measurements, transducers, bridges, interfacing to laboratory computers and automation of experiments.
PREREQ: PHYS 208 or PHYS 245.

PHYS 650  QUANTUM COMPUTATION  3
PREREQ: Prior knowledge of quantum mechanics recommended and familiarity with linear algebra.

PHYS 655  STATISTICAL BIOPHYSICS  3
Molecular biophysics will be studied from the perspective of thermal and statistical physics and linear response theory. Topics include protein folding, protein conformational change, ligand binding, and allosterism; and the intrinsic noise that arises in cell signaling due to the stochastic arrival of individual molecules.
PREREQ: PHYS 5616 or CHEG 828.

PHYS 660  COMPUTATIONAL METHODS OF PHYSICS  3
Introduction to basic computational techniques in science with application to a number of disciplines of current research interest, such as quantum physics, biophysics, statistical mechanics and chaos.

PHYS 669  OBSERVATIONAL ASTRONOMY  3
Hands-on focus on techniques and analysis of astronomical observation, with emphasis on CCD imaging. Topics include celestial coordinates, telescope handling, CCDs, data reduction, and data analysis.
RESTRICTIONS: Meets at Mt. Cuba Observatory in Greenville. Credit can only be received for either PHYS 469 or PHYS 569, not both.

PHYS 695  PHYSICS AND ASTRONOMY COLLOQUIUM  1 PF
The weekly colloquium series introduces students to topics of current interest in research and education in physics and astronomy.

PHYS 806  ATOMIC, MOLECULAR AND OPTICAL PHYSICS  3
Treatment of atomic and molecular systems including experimentally observed phenomena and modern theory techniques. Topics include atomic and molecular structure, light-matter interactions, laser physics, quantum computing, Bose-Einstein condensation, and scattering phenomena.
PREREQ: PHYS 811. COREQ: PHYS 809.

PHYS 809  ELECTROMAGNETIC THEORY I  3
Electrostatics, boundary value problems, Green functions, orthogonal functions, multipole expansion, dielectric media, magnetostatics, Maxwell’s equations, electromagnetic waves in vacuum and in dispersive media (plasmas, dielectrics, and conductors), MHD waves, electromagnetic radiation.
May be crosslisted with MSEG809.

PHYS 810  ELECTROMAGNETIC THEORY II  3
Special relativity, classical field theory, Lagrangians for fields, symmetries and conserved quantities, stress-energy tensor, local symmetry and the gauge principle; masslessness of the photon, the Higgs mechanism, non-abelian generalizations of electromagnetism (the strong and weak forces), electromagnetic waves, the method of virtual quanta, geometrical optics, diffraction.
PREREQ: PHYS 809.
PHYS 811 QUANTUM MECHANICS 3
Develops formal description of quantum systems as states in a complex vector space. Topics include time evolution, path integrals, symmetry groups and quantum conservation laws, parity, angular momentum and tensor operators, operator treatment of the harmonic oscillator, denticile particles, time independent and time dependent perturbation theory, and radiative transitions. Includes a summary of special functions and boundary problems appropriate to simple quantum systems. PREREQ: PHYS610.

PHYS 812 QUANTUM MECHANICS 3
Continuation of PHYS811. Topics include: many-particle wave functions and many-body operators, helium atom, second quantization, advanced topics in perturbation theory, the Hartree-Fock method, a continuation of radiative transitions, scattering theory, and relativistic quantum mechanics. Measurement theory and the interpretation of quantum mechanics. Applications of quantum mechanics discussed throughout. PREREQ: PHYS811

PHYS 813 QUANTUM STATISTICAL MECHANICS 3
Basic concepts of quantum statistical mechanics, density matrix, and quantum partition function. Ideal Bose and Fermi gases; Bose-Einstein condensation. Mean field and Landau theories of phase transitions; critical phenomena; introduction to renormalization group methods. Linear response theory and Boltzmann equation. Interacting quantum many-particle systems. May be crosslisted with ELEG813. PREREQ: PHYS616

PHYS 815 THEORY OF RELATIVITY 3
Critique of the special theory introductory to the general theory; physical basis of the general theory; Einstein's field equations; and problems of gravitational motion and radiation. PREREQ: PHYS809.

PHYS 822 QUANTUM FIELD THEORY 3
Introduction to quantum field theory. Covers symmetry groups (including Lorentz and Poincare groups), classical field theory, relativistic wave mechanics, second quantization, scalar, vector and Fermion fields, quantum electrodynamics, Feynman rules, renormalization theory and the renormalization group.

PHYS 824 INTRODUCTION TO NANOPHYSICS 3
Introduction to rapidly-evolving ideas in nanophysics. Covers principles involved in fabrication of nanosystems and in measurement of phenomena on the nanoscale. Concepts necessary to appreciate applications in such areas as nano-electronics, nano-magnetism, nano-mechanics and nano-optics, are discussed.

PHYS 825 INTERMEDIATE CONDENSED MATTER PHYSICS 3

PHYS 826 ADVANCED TOPICS IN CONDENSED MATTER PHYSICS 3
Topics include Superfluidity, Superconductivity, Magnetism, Linear response theory, Bose-Einstein condensation, Electrodynamics of solids. PREREQ: PHYS825. RESTRICTIONS: May be repeated for up to six credits when topics vary.

PHYS 832 GALACTIC ASTRONOMY 3
A treatment of galaxies with an emphasis on the Galaxy. Topics include stellar dynamics, galactic structure, star counts, stellar clusters, mass models, and dark matter. PREREQ: PHYS620.

PHYS 833 ASTROPHYSICS OF COMPACT OBJECTS 3
Formation and evolution of white dwarf stars, neutron stars and black holes. Topics include supernovae, cataclysmic variables, x-ray and gamma-ray sources. PREREQ: PHYS633.

PHYS 835 PLASMA PHYSICS I: FLUIDS AND MHD 3
Introduction to the properties of electrically conducting fluids and ionized gases. Topics are: particle drifts and adiabatic invariants, cold plasma waves, magnetohydrodynamics (MHD), MHD waves, equilibria, shocks, and instabilities. For each topic, applications to solar system space plasmas, astrophysical plasmas, and laboratory plasmas are presented. PREREQ: PHYS603 or equivalent. COREQ: PHYS604 or equivalent.

PHYS 838 ADVANCED TREATMENT OF SELECTED TOPICS 3-6
Selected topics from: quantum field theory, renormalization group and critical phenomena, nuclear theory, elementary particles and applications of group theory in physics. RESTRICTIONS: May be repeated for up to six credit hours when topics vary.

PHYS 862 SOLID STATE SEMINAR 1
Lectures and discussions by faculty and students on specialized topics in solid state physics.

PHYS 868 RESEARCH 1-9

PHYS 869 MASTER'S THESIS 1-6

PHYS 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.

PHYS 969 DOCTORAL DISSERTATION 1-12 PF

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PHYS 600 PHYSICAL THERAPY AS A PROFESSION 1
Ethics, licensure laws and practice of physical therapy are explored. The Guide to Physical Therapy Practice is introduced and the importance to effective practice discussed. RESTRICTIONS: Open to physical therapy graduate students only.

PHYS 604 FUNCTIONAL ANATOMY AND BIOMECHANICS 4
Gives a description of normal and abnormal human movement. Emphasis on joint structure and function and gait using arthrokinematic and osteokinematic analysis. Evaluation procedures such as EMG, cinematography and computer simulations utilized. PREREQ: PHYT622 RESTRICTIONS: Open to physical therapy graduate students only or with permission of instructor.

PHYS 606 RESEARCH 3
An overview of methodological issues in the conduct of physical therapy research. Topics include scientific method, experimental design, statistical procedures and technical writing. Student expected to critically analyze current physical therapy literature. RESTRICTIONS: Open to physical therapy graduate students only.

PHYS 608 MUSCULOSKELETAL EVALUATION AND TREATMENT 4-8
In-depth analysis of evaluation and treatment strategies of spinal and extremity joints, muscles and connective tissue. Emphasizes research on the physiological basis of immobilization and remobilization. The diagnoses, prognosis, treatment, consultation and basis for referral of orthopedic and musculoskeletal disorders is examined. PREREQ: PHYT604; PHYT622; PHYT624; PHYT632; PHYT633; PHYT634. COREQ: PHYT802. RESTRICTIONS: Open to physical therapy graduate students only.

PHYS 614 SPORTS PHYSICAL THERAPY 3
Advanced orthopedics with emphasis in sports related injuries. Discuss evaluation and intervention of the athlete in the various major joints of the body, as well as other related topics in sports and orthopedics. PREREQ: PHYT608; PHYT622; PHYT604; PHYT602; PHYT808; PHYT624. RESTRICTIONS: Open to physical therapy graduate only.

PHYS 620 EDUCATIONAL PROCESS IN COMMUNITY HEALTH 1
Focuses on the learning/teaching process as defined in the Guide to Physical Therapy Practice for application to the teaching roles of the health professional. PREREQ: All prior PT courses. COREQ: PHYT830. RESTRICTIONS: Open to physical therapy graduate students only.

PHYS 622 CLINICAL GROSS ANATOMY 6
Emphasis on structural and functional aspects of regions of body under study by means of human cadaver, bones, surface anatomy, lectures, computer technology and demonstrations. Clinical significance of anatomical structures is stressed. RESTRICTIONS: Open to physical therapy graduate students only.
PHYT 623 CLINICAL NEUROSCIENCE 4
A study of the structure and function of the human nervous system with major emphasis on the cause-effect relationships between lesions and their symptoms. Emphasis on the neurological principles controlling movement.
PREREQ: PHYT622; PHYT624; PHYT631; PHYT801; PHYT632. COREQ: PHYT633. RESTRICTIONS: Open to physical therapy graduate students only or by permission of instructor.

PHYT 624 BASIC EVALUATION TECHNIQUES 2
Provides an understanding of the philosophy and practice of patient evaluation and physical therapy diagnosis. Muscle performance testing and measurement of joint motion of the extremities is emphasized.
PREREQ: PHYT622. COREQ: PHYT635; PHYT604. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 626 ADVANCED REGIONAL ANATOMY 3
Structural and functional aspects of regions of the body under study are emphasized by means of a dissection of a specific region of the human body.
PREREQ: PHYT622.

PHYT 630 HUMAN MOVEMENT CONTROL 3
Examines theoretical, methodological and empirical issues required for understanding of control and coordination of human movement. Readings and group discussion of implication of issues raised in the literature. Development of proposal to study aspect of motor behavior. May be crosslisted with BMS630.

PHYT 631 PHYSICAL THERAPY IN THE ACUTE CARE ENVIRONMENT 4
Presents diagnoses commonly seen in the acute care environment. The pathological, anatomical, evaluation, documentation and treatment considerations in managing these diagnoses are discussed.
PREREQ: PHYT622. COREQ: PHYT801; PHYT624. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 632 APPLIED PHYSIOLOGY I 3
In-depth analysis of the physiological mechanisms of the cardio-pulmonary system. Lectures in normal and abnormal function of this system. Emphasis on cardiopulmonary testing and rehabilitation techniques including stress tests and pulmonary function tests.
PREREQ: PHYT622; PHYT631; PHYT801. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 633 APPLIED PHYSIOLOGY II 3
Discusses the research on the effects of exercise on the various patient populations (not including cardiopulmonary). Emphasis placed on the musculoskeletal system and on exercise prescription and progression.
PREREQ: PHYT632 RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 634 ELECTROTHERAPY 3-4
Provides an understanding of the physiological basis for the use of physical agents and electrotherapy. Emphasis placed on patient evaluation and clinical applications of modalities used in physical therapy clinics.
PREREQ: All prior physical therapy graduate courses. COREQ: PHYT623; PHYT633. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 635 THERMAL AGENTS AND SOFT TISSUE TECHNIQUES 2
An introduction to thermal modalities and soft tissue mobilization techniques commonly used in current physical therapy practice.
PREREQ: PHYT622. COREQ: PHYT624; PHYT604. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 640 SEMINAR IN MOTOR SYSTEMS NEUROSCIENCE 0-3
Students present and lead discussion of influential articles in the field of motor systems neuroscience, with an emphasis on supraspinal control of movement. May be crosslisted with BMS640. RESTRICTIONS: Class size limited to 8. Permission to enroll required by course coordinator. Previous course work in basic neuroanatomy and neurophysiology strongly recommended. Course is designed for graduate students, but very strong undergraduates student may enroll

PHYT 641 ROUNDS I 1 PF
Weekly clinical cases presented by faculty, clinical faculty, doctoral students and residents in Grand Rounds format for discussion by all students in the physical therapy graduate program.
RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 642 ROUNDS II 1 PF
Weekly clinical cases presented by faculty, clinical faculty, doctoral students and residents in Grand Rounds format for discussion by all students in the physical therapy graduate program.
RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 643 ROUNDS III 1 PF
Weekly clinical cases presented by faculty, clinical faculty, doctoral students and residents in Grand Rounds format for discussion by all students in the physical therapy graduate program.
RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 644 ROUNDS IV 1 PF
Weekly clinical cases presented by faculty, clinical faculty, doctoral students and residents in Grand Rounds format for discussion by all students in the physical therapy graduate program.
RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 801 MEDICAL SCIENCE I: GENERAL MEDICINE 3
Lectures in pathology, clinical medicine, cardiology and pharmacology across the lifespan. Implications for physical therapy are emphasized.
PREREQ: PHYT622. COREQ: PHYT631. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 802 MEDICAL SCIENCE II: ORTHOPEDICS AND MUSCULOSKELETAL IMAGING 4
Focuses on orthopedic pathology, medical and surgical management of musculoskeletal conditions across the lifespan with implications for physical therapy intervention and musculoskeletal imaging. Strengthens physical therapist clinical expertise in comprehensive patient evaluation, diagnosis, treatment planning, and physician interaction.
PREREQ: PHYT622; PHYT604; PHYT624; PHYT632; PHYT633; PHYT634. COREQ: PHYT608 (only for DPT-degree seeking students); no co-requisites necessary for MS-only students.

PHYT 803 MEDICAL SCIENCE III: NEUROLOGY 2-3
Lectures of basic principles of neurology throughout the lifespan. Emphasis placed on medical principles related to diseases most frequently encountered in physical therapy practice.
PREREQ: PHYT622; PHYT623; PHYT624; PHYT801. COREQ: PHYT804; PHYT805. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 804 NEUROPHYSIOLOGIC EVALUATION AND TREATMENT 4
Focuses on the neurophysiologic implications of commonly seen conditions and treatment methods for managing patients with neurologic dysfunctions. Analysis of these methods in light of current issues and theories of motor control, motor learning and neurobehavioral plasticity. Emphasis on learning strategies for treatment rather than through details of specific approaches.
PREREQ: PHYT622; PHYT604; PHYT624; PHYT631; PHYT801; PHYT632; PHYT633. COREQ: PHYT803; PHYT804. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 805 REHABILITATION 4
Advanced instruction in the theory, research and clinical skills necessary for the comprehensive management of patients in a rehabilitation setting with an emphasis on building evidence-based program plans.
PREREQ: All prior core PT courses. COREQ: PHYT803; PHYT804. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 806 GERIATRICS 3
Personal-social, biological, socioeconomic and physiological factors accompanying the aging process examined and their impact on physical therapy intervention explored.
PREREQ: All prior physical therapy graduate courses. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 807 ADVANCED SEMINAR 3-5
Lectures pursue various topics in greater depth and develop advanced clinical skills. Topics include emergency response, wound care, informatics, genomics, women’s health, and specialty populations.
PREREQ: All prior physical therapy graduate courses. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 808 SPINE MANAGEMENT 4
Discusses the biomechanics, pathophysiology and disability associated with spine pain and dysfunction. Includes an understanding of the role of physical therapy evaluation in the determination and implementation of physical therapy interventions.
PREREQ: PHYT604, PHYT608, PHYT622, PHYT624, PHYT801, PHYT623, PHYT634, PHYT802. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 809 PSYCHOSOCIAL ASPECTS OF HEALTH AND DISEASE 3
Discusses the psychosocial characteristics of patient populations and therapists that impact on the rehabilitation process. Death and dying, social implications of illness diagnosis and other topics are discussed.
PREREQ: All prior physical therapy graduate courses. RESTRICTIONS: Open to physical therapy graduate students only.
PHYT 810  CLINICAL MANAGEMENT  2
Discusses concepts of administration and issues in the management of hospital clinics, private practice and consultative ventures. Students introduced to current trends in billing and reimbursement strategies used by clinicians. PREREQ: All prior physical therapy graduate courses.

PHYT 811  PEDIATRICS  4
Instruction in the theory, research and clinical skills necessary for the comprehensive management of pediatric clients and their families. Emphasis on the incorporation of modern development science into evidenced-based program plans. PREREQ: All prior physical therapy graduate courses. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 812  PEDIATRIC INTEGRATED CLINICAL EXPERIENCE  1
Mentored clinical experience in pediatric healthcare facilities. PREREQ: All prior physical therapy graduate courses. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 821  ORTHOPEDIC INTEGRATED CLINICAL EXPERIENCE  3
Mentored clinical experience in University of Delaware Physical Therapy Clinic. Emphasis is orthopedic with some exposure to outpatients with other diagnoses. All students participate in this experience for one semester. PREREQ: All prior physical therapy graduate courses. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 822  NEUROLOGIC AND OLDER ADULT INTEGRATED CLINICAL EXPERIENCE  3
Mentored clinical experience in either the University of Delaware Neurologic and Older Adult Physical Therapy Clinic or a local clinical facility. Emphasis on evaluating and treating a mixed caseload of older clients and/or those with neuologic diagnoses. PREREQ: All prior physical therapy graduate courses. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 830  INTRODUCTION TO CLINICAL EDUCATION  2 PF
Prepares students for academic progression into their clinical affiliations. Overview of clinical education process and reviews all required paperwork. Reviews components of clinical education that will be assessed on their clinical affiliations (such as professionalism and communication). Provided in proper documentation related to patient care. Provide knowledge and skills necessary to prevent, recognize, and provide care for sudden cardiac or respiratory distress. Review current federal and state laws. Topics include with care in the infectious, hazardous materials and the process of state required background checks to protect the public. PREREQ: All previous professional courses. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 831  CLINICAL INTERNSHIP: MULTISYSTEM COMPLEXITY  4
A ten-week, extended, full-time clinical experience wherein students will participate in the PT management of patients with acute health and/or complex multidisciplinary needs. Preference will be given to inpatient hospital placement, though settings with patients containing multisystem and fluctuant health needs will also be considered. PREREQ: All prior physical therapy graduate courses. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 832  CLINICAL INTERNSHIP II OUTPATIENT  3 PF
A six week, full-time clinical experience in an outpatient physical therapy setting. Direct participation in all aspects of patient care under the supervision of a licensed physical therapist. Students involved in all aspects of patient care including, but not limited to, evaluation, treatment, patient and family education, charting, billing, and discharge planning. PREREQ: All prior physical therapy graduate courses. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 833  CLINICAL INTERNSHIP: REHABILITATION  4
A ten-week, extended, full-time clinical experience wherein students will participate in the physical therapy management of patients in a multidisciplinary rehabilitation setting. Preference will be given to neurologic rehabilitative settings, though facilities containing patients with other multidisciplinary needs will also be considered. PREREQ: All prior physical therapy graduate courses. RESTRICTIONS: All prior physical therapy graduate courses.

PHYT 834  CLINICAL INTERNSHIP: ELECTIVE  4
A ten-week, extended, full-time clinical experience wherein students may participate in physical therapy research, teaching, administration, and/or the provision of skilled physical therapy services. Students may choose from a range of practice settings and patient populations. PREREQ: All prior physical therapy graduate courses. RESTRICTIONS: Open to physical therapy graduate students only.

PHYT 868  RESEARCH  1-9
REQUIREMENT: Requires permission of instructor.
PLSC 171 NEW STUDENT COLLOQUIUM 1 PF
Focuses on academics, careers and resources as important components in achieving success in the plant and soil sciences. Practical skills helpful in mastering the first year in the plant and soil sciences majors.
RESTRICTIONS: Open to first year majors only.

PLSC 201 BOTANY II 4
Sexual and vegetative characters of algae, bacteria, fungi, liverworts, mosses, ferns, horsetails, club moss, liverworts, mosses, gymnosperms and angiosperms.
Selected genera within these divisions considered in detail.
PREREQ: PLSC101 or BISC207.

PLSC 202 HISTORY OF LANDSCAPE DESIGN 3
Overview of the history of landscape design from pre-history through the Modern and Post Modern Eras.

PLSC 203 PORTFOLIO REVIEW 1
Students present their work pertinent to the study of landscape design for critique by professional landscape designers. This includes work completed in design related courses including PLSC103,202 and 232. The work may also include samples of the student's independent work in artistic expression and landscape design projects.
PREREQ: PLSC103, PLSC202, and PLSC232.

PLSC 204 INTRODUCTION TO SOIL SCIENCE 3
Fundamentals of soil including origin, composition and classification; physical, chemical and biological properties; significance of soil properties to use and management, and to soil-plant relationships.
PREREQ: CHEM101 or CHEM103 or CHEM1107.

PLSC 205 INTRODUCTION TO SOIL SCIENCE LABORATORY 1
Laboratory exercises in soil science.
COREQ: PLSC204.

PLSC 206 FARM TO TABLE 3
How does food get from the farm to your table? Explore traditional agriculture and contemporary food production models like Community Supported Agriculture (CSA), community gardens and the local food movement. Learn about new crops and dietary strategies that can be incorporated into the way people eat today. Examine cultural influences on food production and consumption patterns, and biocultural aspects of nutrition. Students will complete several projects that include interviews, research, food shopping excursions, film critiques and menu planning. Students will volunteer at the Delaware Food Bank and/or Gardens for the Community.
May be crosslisted with ANTH206, BIAN206.

PLSC 211 HERBACEOUS LANDSCAPE PLANTS 3
Survey of herbaceous plants including annuals, perennials and bulbs; plant identification, culture, selection, design and maintenance in the landscape.

PLSC 212 WOODY LANDSCAPE PLANTS 4
Study of woody plants for landscape use in the mid-Atlantic coastal region, including plant identification, selection and culture.

PLSC 214 INDIGENOUS WOODY PLANTS OF THE EASTERN UNITED STATES 4
Focus on Eastern native United States and broad-leaf and coniferous plants used in the landscape. Topics include native habitat, ornamental features, potential pest problems and taxonomy using cut samples as well as landscape specimens.

PLSC 218 FERMENTATION SCIENCES 3
A basic, survey overview of fermented products. It covers a range of topics, including fermentation history, biochemistry behind fermentation, different fermentative organisms, and production of many popular items such as cheese, bread, beer and vegetables, among other items.
May be crosslisted with ANFS218.

PLSC 222 INTRODUCTION TO SURVEYING 3
Emphasizes concepts and methods of plane surveying for construction applications. Provides field experience with modern surveying instruments. Topics include: distance measurement, leveling, angle measurement, error analysis, coordinate systems, mapping, traversing, and calculation of land areas and earth volumes.
May be crosslisted with CIEG222. RESTRICTIONS: Requires knowledge of trigonometry.

PLSC 232 FOUNDATIONS OF LANDSCAPE ARCHITECTURE 3
Application of design process to local landscape sites. Emphasis on creative problem-solving and aesthetic and ecological principles of design.

PLSC 233 FOUNDATIONS OF LANDSCAPE ARCHITECTURE LAB 1
The most fundamental skill inherent to a designer is the ability to use graphics as a means of expression. Learning landscape graphics and the integration of form and space using the language of site design is a fundamental skill best taught in a traditional studio setting and is the focus of this lab.
COREQ: PLSC232. RESTRICTIONS: Landscape Architecture students or by instructor approval.

PLSC 250 DESIGN PROCESS PRACTICUM 3
Students engage in real-world design/installation projects with the goal of making a difference. Explore the foundations of design process while considering social impact and the application of design principles to spatial and interactive exhibits, with strong focus on user experience (UX) design.

PLSC 253 TRIAD INTERNSHIP 3
On-site experience that introduces students to three regional institutions of public horticulture. For sophomores and juniors, giving them a broad orientation to the leaders, practices and operations of different botanic gardens, arboretums and other established sites of public horticulture.

PLSC 270 BIOTECHNOLOGY: SCIENCE AND SOCIOECONOMIC ISSUES 3
Introduction to agricultural biotechnology and socio-economic issues. Introduces genetic engineering and the basic scientific theory and the applications of biotechnology in agriculture production and research. Presents issues surrounding biotechnology-risk and technology assessment, animal rights, public and private research interface, media and environmental perspectives, consumer acceptance, regulation and economic development.
Crosslisted with ANFS270.

PLSC 275 HEALING PLANTS: MEDICINE, MYTH, MAGIC 3
Merges science, literature, folklore, world cultures, alternative medicine and analysis of current events. Hands-on learning activities include student- researched/developed medicine walk and propagating healing plants. Field trip to Delaware’s Herbarium and to plant-compounds analytical laboratory at Delaware State University planned.

PLSC 300 PRINCIPLES OF ANIMAL PLANT GENETICS 3
Introduction to the theory and application of genetics as related to the improvement of plants and animals.
Crosslisted with ANFS300. PREREQ: PLSC101 or BISC207 or BISC208.

PLSC 302 VEGETABLE SCIENCE 4
Basic factors affecting productivity and marketability of vegetable crops.

PLSC 303 INTRODUCTORY PLANT PATHOLOGY 4
Introduction to nature, causes, development, effects and control of plant disease. Laboratory involves microscope use for examining plant disease specimens and understanding in experience and isolation of culture of pathogenic fungi.
PREREQ: PLSC201 or BISC207.

PLSC 305 SOIL FERTILITY AND PLANT NUTRITION 4
Practical application of the basic principles of soil chemistry, physics and microbiology to modern land use programs. Covers basic principles of nutrient management (availability and cycling in soils, roles in plant nutrition), soil acidity and liming, soil testing, environmental fate of non-essential elements and organic chemicals, and role of risk assessment in soil management.
PREREQ: CHEM102 or CHEM104 or CHEM1108, and PLSC204.

PLSC 306 INTRODUCTION TO PLANT MOLECULAR BIOLOGY 4
Molecular biology of higher plants, including organization of plant genes, genomes, gene expression, gene transfer and genetic engineering.
PREREQ: BISC207.

PLSC 310 ANIMAL AND PLANT GENETICS LABORATORY 1
Laboratory exercises concerning genetic concepts, methods and applications using various plant and animal systems.
Crosslisted with ANFS310. COREQ: ANFS300.

PLSC 313 TURF ESTABLISHMENT AND MAINTENANCE 4
Factors affecting the establishment and maintenance of fine and utility turf; emphasis on the management of golf courses, athletic fields and sod farms.

PLSC 330 THE BUILT ENVIRONMENT 3
Introduction to principles involved in the design and installation of landscape elements: stone, brick, concrete, wood and metal.
PREREQ: PLSC150.
PLSC 332 JUNIOR SYMPOSIUM 1
Landscape Architecture students are required to coordinate a symposium by inviting key speakers to address the major challenges and current debates in the field of landscape architecture. Students are required to present their work during the symposium. Some years this symposium is held in conjunction with other local universities. This collaborative effort gives students an opportunity to identify key speakers, coordinate logistics and budget, and speak in a public forum.
PREREQ: PLSC232 and PLSC250. RESTRICTIONS: landscape Architecture students only.

PLSC 333 ESTIMATING AND BIDDING 1
Overview of the various estimating techniques used by landscape professionals to produce accurate bids and proposals.

PLSC 340 PLANTS OF ECUADOR 3
Plants of major forest types in Ecuador, including native and introduced species as well as plants of medicinal, industrial and agricultural use. Field trips demonstrate principles and provide field experience in plant identification.

PLSC 343 SITE ENGINEERING 4
Introduction to land grading, site layout, drainage, earthwork volumes and erosion and sediment control for landscape and construction sites. May be crosslisted with CIEG343. PREREQ: PLSC232 or PLSC150, or CIEG161 or APEC480 or GEOG250 or GEOG372.

PLSC 350 URBAN DESIGN 3
Advanced design studio projects including small and large-scale landscapes, investigating issues pertinent to both residential and non-residential settings. PREREQ: PLSC232 and PLSC233.

PLSC 354 PLANT ECOLOGY 3
Introduction to plant ecology for upper-level undergraduates. Examine the span of ecology from a uniquely plant perspective, focusing on individual plant interactions with their environment, how the environment acts to shape plants, interactions among plant populations and communities, and larger-scale processes and global issues. Will culminate in learning how to apply basic principles of plant ecology to landscape design.

PLSC 364 LANDSCAPE HORTICULTURE INTERNSHIP 1-6
Supervised, faculty-monitored, career-related experience in one or more aspects of the ornamental horticulture industry.

PLSC 366 INDEPENDENT STUDY 1-6

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

PLSC 399 TEACHING EXPERIENCE 1-2 PF
Practical teaching experience assisting in instruction of an undergraduate course. RESTRICTIONS: Requires overall gpa of 2.75 and 3.0 in major. Must have taken the course in which assisting or have equivalent experience.

PLSC 401 AGRONOMIC CROP SCIENCE 3
Production and management of the major grain and forage crops, with emphasis on diagnosis of production problems and decision making. PREREQ: PLSC151.

PLSC 403 NURSERY AND GARDEN CENTER MANAGEMENT 4
Production, maintenance and marketing of plants relative to the establishment and management of a nursery or garden center. PREREQ: PLSC101 or PLSC151.

PLSC 404 PLANT TAXONOMY 3
Identification, classification and nomenclature of vascular plants, including sight recognition as well as use of alternative-statement keys. Emphasis on economic plant families of eastern United States.

PLSC 410 INTRODUCTION TO PLANT PHYSIOLOGY 3
Physiology of green plants: light and energy conversion, carbon fixation, nitrogen metabolism, amino acid synthesis, protein synthesis mechanics and regulation, water and solute utilization, translocation, photomorphogenesis and photoperiodism and growth hormones, considered at fundamental level of operation. PREREQ: PLSC201 or BIOL208.

PLSC 415 VASCULAR PLANT ANATOMY 3
A developmental and comparative study of the cells, tissues and organs of vascular plants. Readings in the current anatomical literature.

PLSC 419 SOIL MICROBIOLOGY 4
Characterization of microorganisms and microbial habitats in soil environments. Processes and interactions involving soil microorganisms with respect to agricultural productivity and environmental quality. Introduction to laboratory techniques for the observation, enumeration and isolation of soil microorganisms and measurement of associated activities.

PLSC 421 NONPOINT SOURCE POLLUTION 3
Understanding sources, transport pathways, and transformations of important pollutants and toxic chemicals generated by anthropogenic activities. Topics include transport, transformation, and fate of these pollutants in watersheds. Impacts of these pollutants on soil, forest, and aquatic ecosystems using specific case studies. PREREQ: BREG321 or CIEG440 and permission of instructor.

PLSC 422 PLANT PROPAGATION 3
Practical and physiological aspects of the propagation of economic plants including both sexual and asexual methods.

PLSC 429 INTRODUCTION TO THE FUNGI 4
Introduction to the terminology, structures, and classification of the fungi, through the study of representative cultures and specimens. Fungi, mushrooms and molds as food, in industry, plant pathology, and in human health and wellness. Practical laboratory experience emphasized.

PLSC 433 PUBLIC GARDEN MANAGEMENT 3
Introduces the history and principles of public horticulture institutional development within the United States. Comparisons of institutional initiation strategies, collections management, mission development and planning, revenue streams and budgeting, university and non university settings, and public and private considerations for operations.

PLSC 435 PLANT DEVELOPMENTAL BIOLOGY 3
Anatomical and molecular analysis of plant growth and development with focus on how genes regulate pattern formation and cellular differentiation. PREREQ: PLSC300.

PLSC 437 COLLECTIONS MANAGEMENT AND CURATION 3
Organization and maintenance of curatorial records: including; plant records and labeling, organization of seed plants (phylogeny), nomenclature, policy statements and management concerns.

PLSC 438 FATE/TRANSPORT SOIL CONTAMINANTS 3
Fundamental concepts and mechanisms of contaminant fate and transport in porous media. Includes overview of soil and groundwater as resources; types of soil and groundwater contaminants; transformation and attenuation of contaminants; solute transport in saturated and unsaturated systems. PREREQ: MATH221.

PLSC 440 PROFESSIONAL PRACTICE 2
In professional practice, explore and review the responsibilities of landscape architects including the review and creation of project plans and contracts. Concepts such as drawings, schedules, and budgeting are presented. Prepare a professional portfolio for presentation to firms or graduate school. Industry partners provide presentations and critiques for student’s work. PREREQ: PLSC332 and PLSC364. RESTRICTIONS: Landscape Architecture students or by instructor approval.

PLSC 441 FORAGE RESOURCE MANAGEMENT 3
Exploration of the various grasses, legumes, and forbs that have a potential as forage crops. Discussions will cover characteristics of each species that make it suited for a particular type of forage use. Cultural practices for successful plantings, maintenance, harvest and storage and preservation will be covered. May be crosslisted with ANFS402. PREREQ: ANFS340.

PLSC 442 STORMWATER MANAGEMENT 4
Hydrology and water quality for small urban/suburban/rural watersheds. Design of culverts, vegetated waterways, conventional and distributed stormwater management systems. May be crosslisted with CIEG442. PREREQ: CIEG305 or PLSC343 or permission of instructor.
PLSC 445 BIOGEOCHEMICAL CYCLING OF NUTRIENTS 3
Understanding of biogeochemical processes of nutrient (carbon, nitrogen, phosphorus) cycling and transformations in natural and anthropogenic ecosystems; critically examines the environmental impacts by agriculture and industry; explores various tracer methods, including stable and radio-isotopes as well as rare elements and biomarkers.

PLSC 450 ECOLOGICAL PLANTING DESIGN 3
Comprehensive solution of landscape problems. Field application of principles of construction and design. PREREQ: PLSC212 or PLSC214 and PLSC354.

PLSC 453 PUBLIC HORTICULTURE PRACTICUM 3
Focused on-site experience at a public horticulture institution that exposes students to specific management styles, administration structures and decision making situations. Students work with Longwood Graduate Program Fellows to coordinate this experience. PREREQ: PLSC253.

PLSC 455 ISSUES IN PLANT AND SOIL SCIENCES 3
An introduction to current and emerging issues facing the plant and soil sciences professions. Ethics, professionalism, environment, politics, technology and practices will be the foci of discussion groups, student oral and written presentations, case studies, guest lecturers and field trips. RESTRICTIONS: Open to junior and senior majors only.

PLSC 456 SENIOR DESIGN 4
Senior Design is a capstone course structured to prepare the student for an entry level landscape architect position in industry or to provide the foundation for graduate school. Teams initiate a project, define the project program, create a project budget, generate schematic designs, develop a design, and produce a construction package. Individuals have flexibility to produce a senior project that will be included in their graduate school portfolio. Industry partners are consulted for project ideas and critiques. PREREQ: PLSC350 and PLSC450. RESTRICTIONS: Landscape Architecture students.

PLSC 466 INDEPENDENT STUDY 1-6

PLSC 601 AGRONOMIC CROP SCIENCE 3
Production and management of the major grain and forage crops, with emphasis on diagnosis of production problems and decision making. PREREQ: PLSC151.

PLSC 603 SOIL PHYSICS 3
Examines the importance of soil physics in relation to other disciplines of soil and environmental sciences. Topics include status of water in soil, fundamental principles of water flow, differences between saturated and unsaturated water flow, water balance in the field, infiltration, evapotranspiration, heat, gas and solute (contaminant) transport in soil. May be crosslisted with BRE6603.

PLSC 604 PLANT TAXONOMY 3
Identification, classification and nomenclature of vascular plants, including sight recognition as well as use of alternative-statement keys. Emphasis on economic plant families of eastern United States.

PLSC 608 ENVIRONMENTAL SOIL CHEMISTRY 3
Principles of soil chemical reactions and their application to environment including: inorganic and organic soil components, soil solution-solid phase equilibria, sorption phenomena, ion exchange reactions, kinetics of soil chemical processes, redox chemistry, soil acidity and salinity. May be crosslisted with CHEM608. PREREQ: CHEM102 or CHEM104, or CHEM108.

PLSC 615 VASCULAR PLANT ANATOMY 3
A developmental and comparative study of the cells, tissues and organs of vascular plants. Readings in the current anatomical literature.

PLSC 619 SOIL MICROBIOLOGY 4
Characterization of microorganisms and microbial habitats in soil environments. Processes and interactions involving soil microorganisms with respect to agricultural productivity and environmental quality. Introduction to laboratory techniques for the observation, enumeration and isolation of soil microorganisms, and measurement of associated activities.

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

PLSC 629 INTRODUCTION TO THE FUNGI 4
Introduction to the terminology, structures, and classification of the fungi, through the study of representative cultures and specimens. Fungi, mushrooms and molds as food, in industry, plant pathology, and in human health and wellness. Practical laboratory experience emphasized.

PLSC 633 PUBLIC GARDEN MANAGEMENT 3
Introduces the history and principles of public horticulture institutional development within the United States. Comparisons of institutional initiation strategies, collections management, mission development and planning, revenue streams and budgeting, university and non-university settings, and public and private considerations for operations.

PLSC 635 PLANT DEVELOPMENTAL BIOLOGY 3
An anatomical and molecular analysis of plant growth and development with a focus on how genes regulate pattern formation and cellular differentiation.

PLSC 636 PLANT GENES AND GENOMES 3
Advanced survey of genetics in higher plants, including molecular methods of plant biotechnology. Topics include genome composition and evolution, disease resistance, transposable elements and retrotransposons, DNA methylation and epigenetics, quantitative traits, chromosome structure and gene expression. PREREQ: PLSC300 and PLSC306.

PLSC 640 FIELD METHODS IN SOIL-WATER-AIR 3
Principles of field sampling environmental media (soil, water, air, plants), sample preservation, analytical techniques and instrumentation. Data quality assurance/quality control, analyses, interpretation and communication. Gain an understanding of scientific techniques to track bio-physico-chemical processes in soils, plants, water and the atmosphere. Includes hands-on outdoor lab.

PLSC 641 FORAGE RESOURCE MANAGEMENT 3
Exploration of the various grasses, legumes, and forbs that have potential as forage crops. Discussions will cover characteristics of each species that make it suited for a particular type of forage use. Cultural practices for successful plantings, maintenance, harvest and storage and preservation will be covered. May be crosslisted with ANFS602.

PLSC 643 WATERSHED HYDROCHEMISTRY 3
The role of hydrology in the exports of solutes and chemicals from watersheds. Linkages and feedbacks between hydrologic and biogeochemical processes. Mechanistic conceptual models for solute transport will be emphasized. Innovative methods to characterize and quantify solutes in watersheds will be discussed.

PLSC 645 BIOGEOCHEMICAL CYCLING OF NUTRIENTS 3
Understanding of biogeochemical processes of nutrient (carbon, nitrogen, phosphorus) cycling and transformations in natural and anthropogenic ecosystems; critically examines the environmental impacts by agriculture and industry; explores various tracer methods, including stable and radio-isotopes as well as rare elements and biomarkers.

PLSC 671 PARADIGMS IN CELL SIGNALING 3
Overview of important signaling paradigms in animal and plant cells. Primarily literature based, with class discussion and presentations. Topics include direct cell-cell interactions, cell-matrix interactions and various ligand-receptor signaling paradigms. Crosslisted with ANFS671. RESTRICTIONS: Familiarity with Genetics, Molecular and Cell Biology.

PLSC 675 CURRENT TOPICS: PLANT BIOLOGY 1 PF
Journal club for those interested in discussing hot issues of plant biology.

PLSC 800 CURRENT TOPICS IN PLANT SCIENCE 1-3
Discussion of selected topics and recent literature in plant science.

PLSC 802 PROFESSIONAL DEVELOPMENT 1
Professional development including grantsmanship, manuscript writing and reviewing, resume preparation, job interviewing and presentation of research at professional meetings.
PLSC 805 INSECT-PLANT CHEMICAL ECOLOGY 3
Chemically mediated interactions between insects and plants and other organisms involved in the relationship. Perceptual organs, behavioral and physiological response, plant-insect interactions, insect and plant defense, and intraspecific interactions that relate to natural chemicals produced by plants and insects. Presentation-discussion format. Crosslisted with ENWCB85.

PLSC 810 KINETICS AND SURFACE CHEMISTRY OF SOILS 3
Kinetics and mechanisms of soil chemical reactions, including application of chemical kinetics to natural systems, rates of sorption/desorption, redox, precipitation/dissolution, and ion exchange processes and application of surface spectroscopic and microscopic techniques to elucidate reactions at the soil mineral/water interface. May be crosslisted with CHEM410. PREREQ: PLSC608, and either CHEM418 or CHEM443.

PLSC 832 BOTANIC GARDEN MANAGEMENT 1-10
Lecture and laboratory format conducted at Longwood Gardens to familiarize Longwood Fellows with the operations and purposes of all areas of Longwood Gardens and other botanic gardens. RESTRICTIONS: May be repeated for up to ten credits.

PLSC 833 SEMINAR: SOIL SCIENCE 1
Current topics in soil science discussed from the literature.

PLSC 864 SEMINAR PLANNING AND DEVELOPMENT 1 PF
Planning, developing and hosting a major seminar series: topic and speaker selection, format and schedule development, marketing, local arrangements and hosting.

PLSC 865 SEMINAR 1

PLSC 868 RESEARCH 1-9

PLSC 869 MASTER’S THESIS 1-6

PLSC 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. Crosslisted with ANFS874. RESTRICTIONS: Requires permission of instructor.

PLSC 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.

PLSC 969 DOCTORAL DISSERTATION 1-12 PF

PORTUGUESE

PORT 207 BRAZIL: PAST AND PRESENT 3
Introduction to Brazil, its people, and the issues confronting them, with emphasis on understanding historical developments that have shaped contemporary Brazilian society. RESTRICTIONS: Taught abroad in English. Does not satisfy the Arts and Sciences language requirement.

PORT 216 PORTUGUESE FOR SPANISH SPEAKERS I 3
Covers all the basic structures and vocabulary of Portuguese in a concentrated manner covering all of the material in PORT105 and PORT106 in one single semester. PREREQ: Any 300-level Spanish course, or graduate status in Spanish, or being a Heritage speaker of Spanish.

PORT 316 INTENSIVE PORTUGUESE FOR SPANISH SPEAKERS II 3
Continuation of PORT 216. Continued refinement of Portuguese grammar and further development of listening and speaking skills. Includes a reading and writing component. PREREQ: PORT216 or equivalent. RESTRICTIONS: Not open to native speakers of Portuguese.

PORT 366 SPECIAL PROBLEM 1-3

POLITICAL SCIENCE

POSC 102 CIVICS AND ECONOMICS FOR TEACHERS 3
Provides teacher candidates with an understanding of the fundamental content and concepts embedded within the core social studies subjects of civics and economics as they relate to K-8 standards-based instruction. Focuses on developing an understanding of the content in the two subject areas and how that content might be taught effectively. May be crosslisted with ECON102. RESTRICTIONS: Elementary teacher education majors only. Cannot be taken for credit toward economics major or minor or political science major or minor.

POSC 150 INTRODUCTION TO AMERICAN POLITICS 3
The foundations, principles and processes of American politics. Topics include the Constitution, political institutions (Congress, presidency, courts), parties, interest groups, campaigns, elections, public opinion and political participation.

POSC 220 INTRODUCTION TO PUBLIC POLICY 3
Emphasis on what government does, with a focus on substantive policy areas as well as the mechanisms of policy making. Case studies of policy areas (e.g., health policy, environmental policy, social welfare policy, etc.) used to illustrate processes of agenda setting, decision making and policy implementation.

POSC 240 INTRODUCTION TO GLOBAL POLITICS 3
Introduction to key concepts and theories for understanding politics on a global level. Topics include the structure of the international system, causes of war and peace, economic globalization, international organizations and other issues and processes that cross national borders.

POSC 270 INTRODUCTION TO COMPARATIVE POLITICS 3
Introduction to key concepts and patterns in comparative politics. Topics include democratic processes and democratization, economic and political development, political institutions, and civil society. Cases from different parts of the world are examined to provide a grounding in comparative analysis.

POSC 285 INTRODUCTION TO POLITICAL THEORY 3
Introduction to key concepts and theories for understanding politics on a global level. Topics include the structure of the international system, causes of war and peace, economic globalization, international organizations and other issues and processes that cross national borders.

POSC 300 RESEARCH METHODS FOR POLITICAL SCIENCE 3
Introduction to research methods including research design and data analysis.

POSC 301 STATE AND LOCAL GOVERNMENT 3
American federalism with emphasis on government and politics, with special attention to Delaware.

POSC 304 ISLAM, IDENTITY AND GOVERNANCE 3
Theology, philosophy and history of Islam. Includes Quran, Traditions of Prophet Muhammad, Islam law and jurisprudence. Explores different interpretations and manifestations of Islam, both historically and contemporaneously. Surveys rapid globalization of Islam and Muslim communities.

RESTRICTIONS: Credit will not be given for POSC201 or HIST201 and POSC304.

POSC 308 THEORIES OF SEXUALITY AND GENDER 3
Examines the major theoretical approaches to the study of sexuality and gender with an emphasis on queer theory and intersections between sexuality, gender, race, class, and nationality. Crosslisted with SGST308.

POSC 309 POLITICAL CULTURE BY COUNTRY 3
Introduction to the political and civic cultures underpinning and supporting different political systems. Topics may vary depending on host country. May be crosslisted with BAM539, WOM539. RESTRICTIONS: Offered only in conjunction with travel abroad programs. May be taken twice for credit when countries vary.

POSC 310 EUROPEAN POLITICS 3
Provides an overview of the politics in different European countries. We will seek to understand the differences between these countries and the patterns of continuity and change over time. We will also discuss whether one can speak of a European economic and social model.
POSC 311  POLITICALs OF DEVELOPING NATIONS  3
Discusses major political and economic trends in the developing world in recent decades, including struggles with neoliberal economic development policies and efforts to establish working democracies. Country cases from Latin America, Africa, the Middle East and South/East Asia. RESTRICTIONS: Only one of either POSC211 or POSC311 can count for degree credit.

POSC 312  POLITICS OF EAST ASIAN DEVELOPMENT  3
Why do some states develop economically faster than others? What explains different strategies of growth and development? How do different states manage diverse societies and liberalization processes? This class investigates these questions in the context of East and especially Southeast Asia by looking at the relationship between states, markets, and societies. The second part of the course will give particular attention to the politics of Indonesia, Singapore, Malaysia, Thailand and the Philippines.

POSC 313  AMERICAN FOREIGN POLICY  3
The theory, policies and administration of U.S. foreign policy.

POSC 316  INTERNATIONAL POLITICAL ECONOMY  3
Interaction of international political and economic phenomena. Considers history and development of political economy, and the political underpinnings and effects of global monetary, trade, financial and investment systems. Both relations among advanced countries, and between the advanced and poor countries will be considered.

POSC 317  GENDER AND POLITICS  3
Engages gender as a useful lens for the broad study of politics. Includes analysis of gender in shaping personal, group, national and international interactions. May be crosslisted with WOMS317.

POSC 318  PUBLIC OPINION  3
Examines acquisition and change of political beliefs, attitudes, and opinions, and relationship between political considerations and political behavior. Applied emphasis on survey methods and problems of measuring public opinion.

POSC 319  TOPICS IN POLITICS AND BROADCAST JOURNALISM  3
Topics vary and may include the influence of the media on foreign policy, the responsibility of the media on foreign policy or for policy failures or successes. Crosslisted with COMM318. RESTRICTIONS: May be repeated up to three times for credit when topics vary.

POSC 320  PARTIES AND INTEREST GROUPS  3
Examines the role parties and interest groups play in the American political system, particularly the ways in which they attempt to shape public policy and public opinion.

POSC 322  POLITICS AND THE AFRICAN-AMERICAN EXPERIENCE  3
Provides an insight and understanding of race as an intricate part of the political process in the United States. Role of race in United States politics is explored primarily through the political experiences of black Americans and how the political system has responded. May be crosslisted with BAM321.

POSC 324  VOTING AND ELECTIONS  3
Examines various aspects of political behavior including political socialization, the formation of political attitudes and opinion, electoral behavior and political participation. Attention also given to the relationship of political behavior and public policy.

POSC 329  INTERNATIONAL MIGRATION  3
Interdisciplinary introduction to alternative/complementary disciplinary approaches to the study of human movement between states. Offered on a rotational basis by faculty involved in the University of Delaware migration group. May be crosslisted with GEOG329, HIST329, SOC329.

POSC 330  POLITICAL TERRORISM  3
Selectively examines cases, trends and organizations which have made the violence termed terrorism so salient. Also examines whether governments, including the U.S., are responding appropriately to the challenge. RESTRICTIONS: Not open to freshmen except with consent of instructor.

POSC 333  CONTEMPORARY POLITICAL IDEOLOGIES  3
Considers the theoretical development of liberal democracy and significant theoretical and ideological challenges to its dominance including Marxist, Islamist, postcolonial and postmodernist political theories. Students read the original sources of these positions while considering their historical development and application to contemporary politics.

POSC 337  TOPICS IN POLITICAL COMMUNICATION  1 PF
This lecture series focuses on various thematic issues in political communication and campaign politics. Crosslisted with COMM337. RESTRICTIONS: May be repeated twice for credit.

POSC 339  EUROPEAN UNION  3
The European Union is an economic and political union that binds together twenty-seven European countries. This course provides an overview of the history, institutions, policies and controversies surrounding the European Union.

POSC 340  POLITIES AND THE MEDIA  3
Political roles of the media in socialization, political competence, agenda setting, the electoral process and political crises. Emphasis on media-political system interaction and its import in a democratic society. May be crosslisted with COMM340. RESTRICTIONS: Open to majors only.

POSC 350  POLITICS AND THE ENVIRONMENT  3
The political context of environmental issues; air and water pollution, population control, and conservation.

POSC 355  URBAN POLITICS  3
Discusses the emergence, foundation, and nature of politics in urban areas. Topics include the evolution of urban communities, the framework for urban governance and politics, power structures and leadership, and the impact of social and economic problems on development in urban society.

POSC 361  FEMINIST POLITICAL THEORY  3
Overview of feminist political theory examining the ways that gender has shaped politics including topics such as the public/private distinction, family politics, economics, sexual violence, and exclusion. Considers how questions of gender intersect with other forms of identity in the U.S. and globally. May be crosslisted with WOMS361.

POSC 362  DIPLOMACY  3
Diplomacy is the art of formal representation and policy implementation. Diplomats need to understand complex material and represent positions in an effective manner. These skills are applicable in a variety of contexts. Readings, discussions, cases and simulations are used to introduce diplomatic skills.

POSC 363  INTERNATIONAL LAW  3
Introduction to the development, structure, and processes of international law.

POSC 368  POLITICS OF DIFFERENCE  3
Explores how the social construction of difference informs our access to material and symbolic resources and is thus political. Engages with four structures of difference and their intersections: ethnicity/race, class, gender, and sexualities.

POSC 377  ARAB-ISRAELI POLITICS  3
Development of the Arab-Israeli conflict analyzed from the Dreyfus Affair and the Balfour Declaration to current events. May be crosslisted with JWST377.

POSC 380  INTRODUCTION TO LAW  3
Broad overview of the nature, functions and limits of law. Emphasis on law as the political instrument used to regulate, control and promote behavior and deal with social problems. May be crosslisted with LEST380.

POSC 387  AMERICAN POLITICAL THOUGHT  3
Overview of American political thought. Focuses on critical formative periods in American politics, such as the Founding, Civil War and Industrial Revolution, with readings selected from the writings and speeches of key American statesmen.

POSC 390  HONORS COLLOQUIUM  3

POSC 400  PRACTICUM IN TEACHING POLITICAL SCIENCE  3 PF
Available to outstanding senior political science majors interested in obtaining teaching experience at the college level. Provides opportunity to lead discussion sections of students in lower division courses. RESTRICTIONS: Requires permission of instructor.

POSC 401  TOPICS IN LAW AND POLITICS  3
Critical topics in law and politics. Topics will vary. May be crosslisted with WOMS402. RESTRICTIONS: May be taken twice for credit when topics vary.
POSC 402  THE FIRST AMENDMENT  3  Constitutional issues of freedom of speech, press, religion, and separation of church and state.

POSC 403  CIVIL LIBERTIES  3  Focuses on fundamental rights and the constitutional guarantee of equal protection of the laws.

POSC 404  THE JUDICIAL PROCESS  3  Structure, process and personnel of American courts; factors influencing decisions and judicial policy making.

POSC 405  CONSTITUTIONAL LAW  3  Constitutional principles regulating organization and function of federal government. United States Supreme Court decisions placed in a socio-political context.

POSC 407  AMERICAN PRESIDENCY  3  Modern American presidency with emphasis on presidential recruitment, organization and staffing. The nature and exercise of presidential power in the decision making process.

POSC 408  INTERNATIONAL ORGANIZATION  3  Analysis of the organization of the international system, its structure, operating principles, formal and informal components.

POSC 409  TOPICS IN WORLD POLITICS  3  Topics in world politics. Topics will vary.

RESTRICTIONS: May be taken twice for credit when topics vary.

POSC 410  ISLAM IN GLOBAL AFFAIRS  3  Explores three main elements of political Islam - epistemological, reformative and militant, and examines how the struggle to construct Islam is reconstructing the international system.

POSC 411  POLITICS AND POVERTY  3  Relationship of policy making and social conditions in the United States with regard to capacity of government to cope with problems arising from overpopulation and socio-economic differences.

POSC 413  TOPICS IN AMERICAN POLITICS  3  Contemporary topics in American government and politics. May be crosslisted with WOMS413. RESTRICTIONS: May be taken twice for credit when topics vary.

POSC 414  TOPICS IN AMERICAN FOREIGN POLICY  3  Contemporary topics in American foreign policy and policy making. RESTRICTIONS: May be taken twice for credit when topics vary.

POSC 415  FORCE AND WORLD POLITICS  3  Interrelationship of military and foreign policy; military strategies, arms control and disarmament; and the American experience.

POSC 416  ETHNIC CONFLICT AND CONFLICT RESOLUTION  3  What are "ethnic" groups and why do these ethnic groups compete politically, and sometimes fight or even commit genocide, against each other? What can be done to prevent or end such violence? This course will center around a number of case studies of ethnic conflicts and conflict management across Europe, Africa and western Asia.

POSC 417  NATIONAL SECURITY POLICY  3  This course focuses on grand strategy, the basic national security strategy of the United States. Questions addressed include policy to combat terrorism and nuclear proliferation; the rise of China; peacekeeping; the process of making national security decisions; and the history of U.S. grand strategy.

POSC 419  INTERNATIONAL RELATIONS HISTORY  1-3  Presents and examines key themes in the history of international relations across time and the globe (Europe, Asia, Africa, the Americas) like development of a states system and sovereignty, patterns in the practices of war and peace, and development of key institutions of international relations.

POSC 420  INTERNATIONAL CRIMES, CRIMINALS, AND COURTS  3  Examines the core crimes of ICL genocide, crimes against humanity, and war crimes; the courts and tribunals created to try those responsible; and explores why people commit such crimes.

POSC 421  POLITICAL PSYCHOLOGY  3  Political psychology examines how psychological processes, concepts, and theories help to shape our understanding of politics. Major topics include social identity, attitudes and opinions, personality, prejudice, stereotyping, conflict, nationalism, emotion, information processing, and political behavior. PREREQ: POSC150, POSC300.

POSC 423  CONGRESS  3  Examination of U.S. House and U.S. Senate organization including committees and parties, the lawmaking process, campaigns and elections, inter-branch relationships, interest groups and representative democracy.

POSC 425  ADVANCED TOPICS IN POLITICS AND BROADCAST JOURNALISM3-9  Topics vary and may include influence of crisis news on national and international politics, effectiveness of political documentaries and ethical and historical underpinnings of broadcast journalism. Crosslisted with COMM425. RESTRICTIONS: Not open to COMI majors. May be repeated for nine credits when topics vary. When topic is News Documentary, COMM324 suggested prerequisite.

POSC 426  LATIN AMERICAN POLITICS  3  An examination of the dynamics that explain current politics in the region.

POSC 427  POLITICS OF CHINA  3  General introduction to politics and modernization efforts of the People’s Republic of China. Topics include the dilemmas of economic reform, China’s regional challenges, the changing relationship between state and society, and the future of the Chinese Communist Party.

POSC 428  TOPICS IN ASIAN POLITICS  3  Topics in Asian politics. Topics will vary.

RESTRICTIONS: May be taken twice for credit when topics vary.

POSC 429  SOUTHEAST ASIA AND THE WORLD  3  Course examines the international relations of Southeast Asia. Topics include Southeast Asia’s relations with major powers (China, the United States, and Japan); the forces of economic regionalism; and the politics of regional organizations.

POSC 430  INTERMESTIC RELATIONS OF ISLAM AND AMERICA  3  Capstone experience for political science and international relations majors. Explores internestic (international and domestic) relations between Islam and United States. Integrates and applies prior learning about American domestic politics, America’s foreign relations, world politics and existing global crisis between United States and Muslim World in wake of attacks of September 11, 2001 and subsequent United States invasion and occupation of Iraq.

POSC 433  AFRICAN POLITICS  3  Overview of politics and society in sub-saharan Africa including: colonialism, the rise of nationalism, decolonization, single-party and military rule, the role of social movements and religious, class, gender and ethnic identities and the move toward economic and political liberalization.

POSC 434  POLITICAL THOUGHT I  3  From Plato to Machiavelli.

POSC 435  POLITICAL THOUGHT II  3  From Machiavelli to present.

POSC 436  POLITICS AND LITERATURE  3  Explores the contributions of literature - in various forms including the literary genre of film - to the study of politics. Facilitates a better understanding of national or international politics through the voices of acclaimed authors. Regional or temporal focus will vary. May be crosslisted with WOMS436. RESTRICTIONS: May be repeated once for credit when topics/countries differ.

POSC 438  TOPICS IN POLITICAL THEORY  3  Focuses on selected topics in political theory. Topics vary by instructor.

RESTRICTIONS: May be taken twice for credit when topics vary.

RESTRICTIONS:
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSC 439</td>
<td>Topics in African Politics</td>
<td>3</td>
<td>Examination of selected topics in contemporary African politics. Topics will vary. May be crosslisted with BAMS439. RESTRICTIONS: May be taken twice for credit when topics vary.</td>
</tr>
<tr>
<td>POSC 440</td>
<td>Comparative Public Opinion</td>
<td>3</td>
<td>Examines theories, sources, characteristics, and impact of public opinion across different regions. Topics include public opinion and democracy, support for political institutions, media and public opinion, economic conditions and public opinion, and political culture and values. PREREQ: POSC150, POSC300</td>
</tr>
<tr>
<td>POSC 441</td>
<td>Contemporary Politics by Country</td>
<td>3</td>
<td>Study of contemporary politics by country. Course is only taught abroad. May be repeated for credit when topics vary. May be crosslisted with WOMS441.</td>
</tr>
<tr>
<td>POSC 442</td>
<td>Topics in European Politics</td>
<td>3</td>
<td>Examination of current trends in European politics. Topics will vary. RESTRICTIONS: May be taken twice for credit when topics vary.</td>
</tr>
<tr>
<td>POSC 443</td>
<td>China and the World</td>
<td>3</td>
<td>Historical and theoretical examination of Chinese foreign policy since 1949, including discussion of China's relations with larger and developing powers, China's historical conception of itself in the world, significance of China's interdependence with the world and China's participation in international and regional organizations.</td>
</tr>
<tr>
<td>POSC 444</td>
<td>Global Agenda</td>
<td>3</td>
<td>Seminar survey of current geopolitical problems facing the US government and global news media. Guest lecturers and practitioners in diplomacy and the international media explore the problems, US foreign policy and media influence upon both. May be crosslisted with COMM444. RESTRICTIONS: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>POSC 445</td>
<td>Human Rights and World Politics</td>
<td>3</td>
<td>Alternative theories of human rights examined in cross-cultural and international contexts. International documents, contemporary cases (e.g. South Africa) and U.S. foreign policies also examined and evaluated.</td>
</tr>
<tr>
<td>POSC 446</td>
<td>International Human Rights on Film</td>
<td>3</td>
<td>A study of the history, evolution and current status of universal human rights using film as a primary medium. Content covers origins of the international human rights movement during and after WWII. A series of feature films and documentaries also highlights recent and current human rights violations in foreign nations.</td>
</tr>
<tr>
<td>POSC 447</td>
<td>National Agenda</td>
<td>3</td>
<td>Seminar offered in conjunction with speaker series focused on current policy and political problems facing the United States. Guest lecturers, office holders and candidates, political and media practitioners explore the problems and their implications for the nation and for campaigns and decision making. May be crosslisted with COMM447.</td>
</tr>
<tr>
<td>POSC 448</td>
<td>Theories of International Relations</td>
<td>3</td>
<td>Surveys the theoretical debates regarding how we can conceive of and understand world politics, as well as how we can evaluate contending perspectives. Considers such schools of thought as ancient, idealist, realist, behavioralist, interdependency, radical, neo-realist and post-structuralist perspectives.</td>
</tr>
<tr>
<td>POSC 449</td>
<td>Ethics and Politics</td>
<td>3</td>
<td>Address ethical issues directly related to national and international politics. Primary focus on international level, primary medium film (feature and documentaries). Topics realpolitik, idealism, pacifism, torture, just war theory, genocide, impunity for mass murder, and international justice.</td>
</tr>
<tr>
<td>POSC 450</td>
<td>Topics in Latin American Politics</td>
<td>3</td>
<td>Current political issues in selected Latin American countries. RESTRICTIONS: May be taken twice for credit when topics vary.</td>
</tr>
<tr>
<td>POSC 452</td>
<td>Topics in Urban Politics</td>
<td>3</td>
<td>Course will cover topics in Urban Politics. Topics will vary. RESTRICTIONS: May be taken twice for credit when topics vary.</td>
</tr>
<tr>
<td>POSC 453</td>
<td>Comparative Political Economy</td>
<td>3</td>
<td>Overview of debates in Comparative Political Economy, with a focus on Europe and advanced industrial countries. Topics include different analytical tools and approaches for studying CPE, debates over Varieties of Capitalism, and capitalism itself. RESTRICTIONS: May be taken twice for credit when topics/countries vary.</td>
</tr>
<tr>
<td>POSC 454</td>
<td>Political Science Careers and Practice</td>
<td>3</td>
<td>Introduction to profession of academic research in the social sciences, and focus on the fundamental tenets of scientific inquiry, research design and empirical analysis, scientific writing and presentation. Students interested in post-graduate education should especially consider this course. PREREQ: Students should have taken Introduction to Data Analysis (POSC 300), or an equivalent course; and, students should have also completed their second writing course requirement.</td>
</tr>
<tr>
<td>POSC 455</td>
<td>Post-Soviet Union</td>
<td>3</td>
<td>Examines the political history, politics and economy of contemporary Russia. Topics include why the Soviet Union broke up, how Putin dominated the nominally democratic Russian political system, Russian political culture and ethnic diversity, Russia's economic problems, and its foreign policy.</td>
</tr>
<tr>
<td>POSC 456</td>
<td>Sexuality and Law</td>
<td>3</td>
<td>Examines the regulation of sexual practices and identities through the law with a specific focus on how the development of political policy and legal norms at the state and federal level reflects changes in sexual norms as a consequence of social movement activity. May be crosslisted with WOMS459.</td>
</tr>
<tr>
<td>POSC 461</td>
<td>Topics in Gender and Politics</td>
<td>3</td>
<td>Topics in gender and politics. Topics will vary. May be crosslisted with WOMS461.</td>
</tr>
<tr>
<td>POSC 462</td>
<td>Climate Change: Policy, Equity and Mitigation</td>
<td>3</td>
<td>Focuses on climate change equity, international compliance mechanisms, and US initiatives. It is designed for graduate students and advanced undergraduates who seek to gain substantive understanding of climate change policy and the means, impediments and opportunities to reaching resolution of complex international questions. Crosslisted with MAST462.</td>
</tr>
<tr>
<td>POSC 463</td>
<td>United Nations</td>
<td>3</td>
<td>Examines the development, institutional structure, and prospects of the United Nations and UN system.</td>
</tr>
<tr>
<td>POSC 464</td>
<td>Internship in Political Science and International Relations</td>
<td>1-6</td>
<td>Internship in a political science or international relations-related field. Includes preparation of a journal of activities and a final project. RESTRICTIONS: Requires permission of instructor.</td>
</tr>
<tr>
<td>POSC 466</td>
<td>Independent Study</td>
<td>1-6</td>
<td>Opportunity for students to undertake mutually agreed upon independent study with selected faculty.</td>
</tr>
<tr>
<td>POSC 468</td>
<td>Undergraduate Research</td>
<td>1-6</td>
<td>Research conducted under the direction of or in conjunction with a faculty member. May result in a major research paper or be incorporated into a faculty project.</td>
</tr>
<tr>
<td>POSC 471</td>
<td>Polling Research and Analysis</td>
<td>3</td>
<td>Applied experience conducting research using polling data. Develop, implement, and report on a research project based on actual polling data. When taught during the spring semester the course will conduct the Blue Hen Poll, examining undergraduate opinion at UD. PREREQ: Enrollment for this course will be capped at 20 students, but future decisions about size will be based on demand. To maximize the effectiveness of the course, there will be two prerequisites. Students should have taken Introduction to Data Analy.</td>
</tr>
<tr>
<td>POSC 472</td>
<td>Democratic Theory</td>
<td>3</td>
<td>Examines some of the most influential attempts to provide the theoretical foundations of democracy. Explores various critical perspectives that highlight the limitations and dangers of democracy.</td>
</tr>
<tr>
<td>POSC 473</td>
<td>Gender, Sex and Law</td>
<td>3</td>
<td>Examines the utilization of the law for the purposes of gender equity examining how the courts at the federal and state levels have been used to challenge sex-based discrimination, gender norms, and political inequality. May be crosslisted with WOMS473.</td>
</tr>
<tr>
<td>POSC 475</td>
<td>Model United Nations</td>
<td>3</td>
<td>Intensive preparation for effective participation in the National Model United Nations held in New York City each spring.</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
<td>Description</td>
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<tr>
<td>POSC 476</td>
<td><strong>ELECTION LAW</strong></td>
<td>3</td>
<td>Explores the legal structure of the political process in America. Addresses topics such as voting rights, voter representation, campaign speech, redistricting and gerrymandering, the role of political parties, campaign finance law, and election administration. PREREQ: POSC402 or POSC403 or POSC405 or POSC380. RESTRICTIONS: Must attend the first class. Participation in class is mandatory, as is consistent attendance.</td>
</tr>
<tr>
<td>POSC 480</td>
<td><strong>TOPICS IN ENVIRONMENTAL POLITICS</strong></td>
<td>3</td>
<td>Focuses on selected topics in politics of the environment in the USA and/or internationally. Topics will vary.</td>
</tr>
<tr>
<td>POSC 482</td>
<td><strong>AMERICA IN THE MIDDLE EAST</strong></td>
<td>3</td>
<td>Examines history of America’s engagement with an emphasis on issues since 1979. After brief intro portion on the mechanics of American foreign policy-making and America’s global political and strategic position over time, we will spend most of the semester on America’s involvement in regional oil politics, Middle East peace process, first and second Iraq Wars, relations with Iran, plans for Middle East democratization and the Bush II administration. Evaluation will be based upon a mid-term and final exam, a medium-length research paper, and one or two short writing assignments. May be crosslisted with JWS482.</td>
</tr>
<tr>
<td>POSC 483</td>
<td><strong>WASHINGTON D.C. POLICY PRACTICUM</strong></td>
<td>3-6</td>
<td>Students will live in Washington D.C. and be placed in intern positions. Class will include lectures and site visits and discussions with practitioners and instructors. Crosslisted with UAPP433. RESTRICTIONS: Approval of instructor.</td>
</tr>
<tr>
<td>POSC 802</td>
<td><strong>SEMINAR: COMPARATIVE POLITICS OF THE GLOBAL SOUTH</strong></td>
<td>3</td>
<td>Issues, concepts, and scholarship regarding the politics of the developing and transitional countries of Africa, Asia, Eastern Europe and Latin America in a global governance context. Topics may include democratic transition and consolidation, comparative democracy, political economy of liberal economic reform, religion and political culture, new nationalism and ethnic conflict, and international systemic influences on all the above.</td>
</tr>
<tr>
<td>POSC 804</td>
<td><strong>SEMINAR: COMPARATIVE POLITICS OF POST-INDUSTRIAL POLITIES</strong></td>
<td>3</td>
<td>Issues, concepts, and scholarship regarding the politics of advanced industrial nations of Europe, North America and East Asia in a global context. Topics may include state theory and the new institutionalism, political culture and nationalism, the welfare state and reform, party systems, civil society and new social movements, regional integration and transnational dimensions of policy processes.</td>
</tr>
<tr>
<td>POSC 805</td>
<td><strong>TOPICS IN LAW AND POLITICS</strong></td>
<td>3</td>
<td>Focuses on selected topics in law and politics. RESTRICTIONS: Graduate students only. May be taken twice for credit when topics vary.</td>
</tr>
<tr>
<td>POSC 806</td>
<td><strong>NORMATIVE ISSUES IN GLOBAL GOVERNANCE</strong></td>
<td>3</td>
<td>Examines normative issues in contemporary global governance from perspective of diverse ethical traditions and/or political philosophy.</td>
</tr>
<tr>
<td>POSC 807</td>
<td><strong>AMERICAN POLITICAL BEHAVIOR</strong></td>
<td>3</td>
<td>Introduces students to the literatures on political participation, voting behavior, and public opinion in the U.S. Major topics include inequalities in political involvement, the sources and structure of public attitudes, the influence of the media and campaigns, and the criteria citizens use to make vote choices.</td>
</tr>
<tr>
<td>POSC 808</td>
<td><strong>AMERICAN POLITICAL INSTITUTIONS</strong></td>
<td>3</td>
<td>Explores major themes, viewpoints, issues and topics pertaining to the American political system. Themes include stability, change, conflict, American exceptionalism, American political thought, alternative perspectives on democracy, analysis of political parties, interest groups, Congress, the presidency and the courts.</td>
</tr>
<tr>
<td>POSC 811</td>
<td><strong>TOPICS IN COMPARATIVE POLITICS</strong></td>
<td>3</td>
<td>Focuses on selected topics in Comparative Politics. RESTRICTIONS: May be taken twice for credit when topics vary.</td>
</tr>
<tr>
<td>POSC 812</td>
<td><strong>TOPICS IN INTERNATIONAL RELATIONS</strong></td>
<td>3</td>
<td>Focuses on selected topics in international relations. May be taken twice for credit when topics vary.</td>
</tr>
<tr>
<td>POSC 813</td>
<td><strong>SEMINAR: AMERICAN FOREIGN POLICY</strong></td>
<td>3</td>
<td>Overview of contemporary American foreign policy and policy making, as well as the analytical, conceptual and methodological problems associated with foreign policy analysis.</td>
</tr>
<tr>
<td>POSC 814</td>
<td><strong>POLITICAL ECONOMY OF THE ENVIRONMENT</strong></td>
<td>3</td>
<td>Reviews major theories developed over the last half century to explain nature-society relations. Policy case studies on environmental justice, trade and environment, global climate change, and sustainable development used to evaluate current range of political-economic explanations of nature-society relations. International, national and local responses to these problems are analyzed. Crosslisted with ENEP810.</td>
</tr>
<tr>
<td>POSC 815</td>
<td><strong>INTRODUCTION TO STATISTICAL ANALYSIS FOR POLITICAL SCIENCE</strong></td>
<td>3</td>
<td>Training in the basics of statistical analysis and quantitative approaches to politics and society. Topics include elementary statistics, probability theory, hypothesis testing and regression analysis. Provides foundation for further quantitative methods.</td>
</tr>
<tr>
<td>POSC 816</td>
<td><strong>PHILOSOPHY OF SCIENCE AND RESEARCH DESIGN</strong></td>
<td>3</td>
<td>Provides advanced training in philosophy of science and research design. Intended to provide students with the training and skills necessary to design dissertation proposals and write dissertations.</td>
</tr>
<tr>
<td>POSC 818</td>
<td><strong>ENVIRONMENTAL POLITICS AND POLICY</strong></td>
<td>3</td>
<td>U.S. and international environmental politics, policies, laws, and agreements regarding air, water, and natural resource protection. Examines environmental governance regimes, politics and science, theories of environmental policy, public and private interaction, and epistemic communities in global warming, ozone layer protection, environmental public health, etc. May be crosslisted with MAST71, UAPP818.</td>
</tr>
<tr>
<td>POSC 822</td>
<td><strong>TOPICS IN POLITICAL THEORY</strong></td>
<td>3</td>
<td>Focuses on selected topics in political theory. RESTRICTIONS: May be repeated once when topics vary.</td>
</tr>
<tr>
<td>POSC 824</td>
<td><strong>COMPARATIVE POLITICAL ECONOMY</strong></td>
<td>3</td>
<td>The economy is political, and there are several ways to organize a capitalist economy. This seminar explores varieties of capitalism across the world. Focuses on theoretical approaches and on empirical questions; how did different varieties originate? Are they converging? Can egalitarian varieties survive?</td>
</tr>
<tr>
<td>POSC 826</td>
<td><strong>ISLAM IN GLOBAL AFFAIRS</strong></td>
<td>3</td>
<td>Explores three main elements of political Islam - epistemological, reformative and militant, and examines how the struggle to construct Islam is reconstructing the international system.</td>
</tr>
<tr>
<td>POSC 828</td>
<td><strong>FEMINIST INTERNATIONAL RELATIONS</strong></td>
<td>3</td>
<td>Surveys feminist International Relations literature from classic works to contemporary research, problematizing how gender permeates the study and practices of global politics. Class intersects/engages postcolonial, poststructural and other critical approaches while also providing an introduction to the variety of feminist methodologies in the field.</td>
</tr>
<tr>
<td>POSC 830</td>
<td><strong>SEMINAR: INTERNATIONAL RELATIONS</strong></td>
<td>3</td>
<td>Surveys broad range of international relations theory including realism, neo-realism, interdependence, unit-level analysis, regime theory, world system theories, post-structuralism, feminism and normative theory. Epistemological and conceptual problems associated with international relations research are explored.</td>
</tr>
<tr>
<td>POSC 836</td>
<td><strong>DEMOCRATIC THEORY</strong></td>
<td>3</td>
<td>Examines some of the most influential attempts to provide the theoretical foundations of democracy. Explores various critical perspectives that highlight the limitations and dangers of democracy.</td>
</tr>
<tr>
<td>POSC 840</td>
<td><strong>INTERNATIONAL POLITICAL ECONOMY</strong></td>
<td>3</td>
<td>Considers the political underpinnings and effects of the interaction of political and economic processes at the global level. Reviews schools of thought and various topics including long cycles, foreign investment, monetary and trade regimes, and the political dilemmas of growth and stagnation.</td>
</tr>
</tbody>
</table>
PSYC 105  POSITIVE PSYCHOLOGY  3
Positive Psychology is a branch of psychology that focuses on the empirical study of the attributes that enable individuals and communities to thrive. The course will help students learn how to optimize personal health and happiness and that of communities and organizations.

PSYC 120  ECOLOGICAL PSYCHOLOGY  3
Examines how the brain interacts with environment in generating behavioral outcomes. Focuses on neuro-anatomy, and psychological, ecological, and behavioral principles.

PSYC 207  RESEARCH METHODS  3
Reviews the major issues involved in the design of psychological experiments. Includes measurement issues, internal and external validity of experiments, research with single subjects, and research ethics. Discusses both laboratory and field research.
PREREQ: Grade of C- or better in PSYC100. RESTRICTIONS: Majors and minors only.

PSYC 209  MEASUREMENT AND STATISTICS  3
Theory and the application of statistical techniques to psychological data.
PREREQ: Grade of C- or better in PSYC100 or NSCI100 and one course in basic college mathematics. RESTRICTIONS: Open to majors and minors in Psychology and Neuroscience majors.

PSYC 301  PERSONALITY  3
A survey of data and theories of human personality and affect.
PREREQ: PSYC100

PSYC 303  INTRODUCTION TO SOCIAL PSYCHOLOGY  3
Analysis of interpersonal behavior with special emphasis on problems of conformity and influence; the organization and dynamics of social groups; and the development of opinions and attitudes.
PREREQ: PSYC100

PSYC 310  SENSATION AND PERCEPTION  3
Theories and experimental study of sensation and perception.
PREREQ: Grades of C- or better in PSYC207 and in PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301), except for Neuroscience majors.
RESTRICTIONS: Open to psychology majors and minors and Neuroscience majors.

PSYC 312  LEARNING AND MOTIVATION  3
Experimental study of contemporary theories of learning and motivation.
PREREQ: Grades of C- or better in PSYC207 and in PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301), except for Neuroscience majors.
RESTRICTIONS: Open to psychology majors and minors and Neuroscience majors.

PSYC 314  BRAIN AND BEHAVIOR  3
Surveys the neural bases of phenomena such as perception, learning, memory, motivation, anxiety, and depression from a psychobiological perspective. May be crosslisted with CGSC314. PREREQ: Grade of C- or better in PSYC100 or NSCI100.

PSYC 320  INTRODUCTION TO NEUROSCIENCE  3
Survey of the basic sciences of the brain in relation to behavioral phenomena, including perception, memory, fear and aggression, and several mental disorders. Crosslisted with NSCI200. PREREQ: C- or better in PSYC100 or NSCI100.

PSYC 325  CHILD PSYCHOLOGY  3
Survey of the interactions of physiological, psychological, and environmental factors determining psychological development. Consideration of major theories of child development.
PREREQ: PSYC100

PSYC 332  HEALTH PSYCHOLOGY  3
This course is an introduction to the field of clinical health psychology, focusing on the biopsychosocial model of health. The topics include stress and coping, cancer, diabetes, and cardiovascular disease.
PREREQ: PSYC100

PSYC 333  PSYCHOLOGY OF WOMEN  3
Psychological analysis of the meaning and implications of being a woman and cause and consequences of the female experience. Biological sex vs. psychological sex-role identity, stereotyping, discrimination, self-concept and the feminist perspective. May be crosslisted with WOMS333. PREREQ: PSYC100

PSYC 334  ABNORMAL PSYCHOLOGY  3
Disorders of behavior and consciousness including the various psychoses, psychoneuroses, mental deficiency, and other conditions.
PREREQ: PSYC100. RESTRICTION: Credit cannot be received for both PSYC334 and PSYC380.
PSYC 336  PSYCHOLOGY OF HUMAN SEXUALITY  3
Examination of human sexuality using the theoretical perspectives and empirical methods of psychology. Topics include sexuality development, sexual behavior and communication, and sexual disorders and dysfunctions. Emphasis is placed on the influence that social factors have on individual sexual expression. PREREQ: PSYC100.

PSYC 340  COGNITION  3
Examination of how the mind works, covering topics such as perception, vision, attention, memory, language, concepts and decision making. Major themes include understanding the mind/brain relationship, using empirical data to develop and evaluate cognitive theories, and understanding the implications of cognitive research for everyday life.

Be crosslisted with CGSC340. PREREQ: Grades of C- or better in PSYC207 and in PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301), except for Neuroscience majors. RESTRICTIONS: Open to psychology majors and minors and Neuroscience majors only.

PSYC 344  PSYCHOLOGY OF LANGUAGE  3
Describes the nature of human language, how it is used to speak and comprehend, and how it is learned. Subtopics include language and thought, animal communication, and language in special populations, such as children born deaf or blind.

PREREQ: Grades of C- or better in PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301) or CGSC170.

PSYC 350  DEVELOPMENTAL PSYCHOLOGY  3
An analysis of theory and research in developmental psychology including the topics of developmental processes, developmental risk, systems theory and contemporary social issues.

PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to psychology majors and minors only.

PSYC 365  PSYCHOLOGY FIELD PLACEMENT  1-6
Course requires students to apply information from previous courses to field work in a psychology-related community agency. Requirements include a minimum of nine hours per week working in a community agency, institution or business, weekly reflective writing assignments, and a final paper. Students must attend two organizational meetings during the first two weeks of the semester.

PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to majors and minors only.

PSYC 366  INDEPENDENT STUDY  1-6
Participation in research program of a faculty member.

PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to Majors and Minors Only. Requires permission of faculty member.

PSYC 369  RESEARCH SEMINAR  3-6
Research experiences in faculty laboratories and meet for one hour a week. Focuses on analysis of articles, and presentation and critique of on-going research.

PREREQ: PSYC100, PSYC207, PSYC209. RESTRICTIONS: Open to Majors only.

PSYC 370  RESEARCH IN PERSONALITY  3
An analysis of contemporary issues and research in personality including the assessment of personality traits, the personality situation interaction and the social and biological bases of individual differences.

PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to majors and minors only.

PSYC 380  PSYCHOPATHOLOGY  3
Exploration of research on diagnosis, etiology and treatment of major pathological disorders. Emphasis on original research articles, class discussion and assessment instruments, in addition to analysis of video-taped interviews with patients used to illustrate the disorders.

PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to majors and minors only. Credit cannot be received for both PSYC334 and PSYC380.

PSYC 390  SOCIAL PSYCHOLOGY  3
An analysis of theory and research in social psychology including the topics of social cognition, attitudes, interpersonal, group and intergroup relations. Student-designed research projects including data analysis.

PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to majors and minors only.

PSYC 394  CULTURAL PSYCHOLOGY  3
Introduction to how culture shapes psychological experience, including social behavior, cognition, motivation, and the experience of the self. Covers psychological theory and research on human cultural variation and focuses on different national populations (especially North America and East Asians), with some attention to the psychological experience of multicultural populations within the United States.

PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to majors and minors only.

PSYC 403  PSYCHOLOGY OF NONVERBAL BEHAVIOR  3
Seminar on social psychological implications of research literature on nonverbal behavior in social interaction. Focuses on interpersonal attraction, leadership, impression formation, causal attribution, deception, social attitudes and cross-cultural factors, with practical applications.

PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to majors and minors only.

PSYC 406  REDUCTION OF INTERGROUP CONFLICT  3
Reduction of intergroup conflict in business, educational and experimental laboratory settings, with special attention given to organizational mergers.

Investigation of strategies for reducing intergroup conflict.

PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to majors and minors only.

PSYC 407  EMOTIONS AND PREVENTIVE INTERVENTION  3
Emotions: their neural, expressive, and experiential components and their relation to adaptive and maladaptive behavior. Translating emotion theory and research into therapeutic and preventive interventions. Requirements include doing emotion tutoring with a child.

PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to majors and minors only.

PSYC 408  PSYCHOLOGY OF PREJUDICE  3
Conduct research on prejudice as a team and also become familiar with the relevant scholarly literature that provides a backdrop for the research.

PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to majors and minors only. Requires permission of instructor.

PSYC 409  ETHICS IN PSYCHOLOGY  3
Focuses on ethical issues, codes, principles, and dilemmas relevant to experimental and applied fields of Psychology.

PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to majors and minors only.

PSYC 410  RELIGION AND PSYCHOLOGY  3
Explore religion from various psychological points of view, on the one hand, and psychology from various religious points of view. Examine authors which blur the distinctions between these three approaches. We will not be attempting to reduce religious experience to one or another normal or abnormal psychological state. Explore how religious experiences can be viewed as real experiences for which one should be able to provide a psychological account.

Crosslisted with PHIL410.

PSYC 414  DRUGS AND THE BRAIN  3
Topics covered include drug treatment of mental illness, and drug abuse/addiction. May be crosslisted with NSCI414. PREREQ: PSYC209.

PSYC 415  HISTORY AND SYSTEMS OF PSYCHOLOGY  3
Psychology from a social history perspective, focusing on models explaining human behavior at both group and individual levels.

PREREQ: C- or better in PSYC100 or NSCI100.

PSYC 416  PSYCHOLOGICAL PERSPECTIVES ON THE BLACK AMERICAN  3
Experience of Black Americans as viewed from a psychological perspective. Psychological theory and research pertaining to Black Americans; reactions to oppression, collective behavior, personality development, and life styles.

May be crosslisted with BAM5416. PREREQ: Grades of C- or better in PSYC207 and PSYC209. RESTRICTIONS: Open to junior and senior psychology majors and minors only.

PSYC 420  MENTAL ILLNESS: HISTORICAL AND CRITICAL PERSPECTIVES  3
Explores historical and current issues in understanding mental illness from biomedical and social constructionist perspectives. Focuses on recent advances and problems in conceptions of cause, diagnosis, and intervention.

PREREQ: C- or better in PSYC100 or NSCI100.
PSYC 423 APPLIED BEHAVIORAL ANALYSIS 3
ABA is the science of bringing about positive behavior change. Potential applications include behavioral healthcare, self-modification, parenting, business, and training non-human animals. Both Operant and Respondent techniques are reviewed, as well as behavioral assessment, observation, and recording. PREREQ: PSYC100.

PSYC 424 APPLIED SOCIAL PSYCHOLOGY 3
Application of basic principles of interpersonal behavior to everyday life. Topics include persuasion, reciprocation, employee motivation, organizational development, liking and authority. PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOC3101). RESTRICTIONS: Open to majors and minors only.

PSYC 425 FAMILY CONFLICT AND THE CHILD 3
Analysis of conflicted relationships within family and their implications for developmental outcomes. Topics include transition to parenthood, spanning and coercive relationships, maltreatment, and marital conflict and disruption. The approach consists of assessment of risk models. PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOC3101). RESTRICTIONS: Open to majors and minors only.

PSYC 428 NATURE VS NURTURE 3
Examines the contribution of biological and environmental determinants to individual differences in behavior and disease.

PSYC 430 THE SOCIAL SELF 3
Explores the self-concept as studied by contemporary social and personality psychologists. Topics include self-knowledge, implicit and explicit cognition, self-esteem, and self-regulation. PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOC3101). RESTRICTIONS: Open to majors and minors.

PSYC 431 HORMONES AND BEHAVIOR 3
Examines how hormones produce changes in behavior over the life course. Topics include mating and parental behavior, aggression, stress and depression, and learning and memory. PREREQ: PSYC100 or NSCI100, PSYC209. RESTRICTIONS: Restricted to Psychology majors and minors and Neuroscience (NSCI) majors and minors.

PSYC 432 ADVANCED HEALTH PSYCHOLOGY 3
This course is an introduction to the field of clinical health psychology, focusing on the biopsychosocial model of health. The topics include stress and coping, cancer, diabetes, and cardiovascular disease. PREREQ: PSYC100, PSYC207, PSYC209. RESTRICTIONS: Restricted to Majors and Minors only.

PSYC 433 COGNITIVE NEUROSCIENCE 3
Examines brain mechanisms responsible for cognitive functions such as perception, memory, and language. Surveys methods for relating mind and brain, including brain-damaged patients, and brain imaging techniques. May be crosslisted with NSCI433. PREREQ: PSYC209.

PSYC 436 NATURE VS NURTURE 3
Examines the contribution of biological and environmental determinants to individual differences in behavior and disease. PREREQ: PSYC209. RESTRICTIONS: Open to PSYC majors and minors and NSCI majors and minors.

PSYC 438 HUMAN COMPUTER INTERACTION 3
Explores the design, implementation and evaluation of interactive computing systems for human use. Hands-on project examples include the design of web pages and mobile devices. Basic concepts and applied techniques necessary for the design of user-friendly interfaces are presented. Course structure allows application of creative abilities, with knowledge gained in the course, to design user-centric innovative technologies. Previous computer programming experience is not a prerequisite. PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOC3101). RESTRICTIONS: Open to majors and minors only.

PSYC 440 TOPICS IN PSYCHOLINGUISTICS 3
Advanced study in psychology of language. Topics may include linguistic and conceptual development, language and space, acquisition of the lexicon, biology and environment in language learning, and language comprehension. PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOC3101). RESTRICTIONS: Open to majors and minors only.

PSYC 442 PERCEPTION, MEMORY AND IMAGINATION 3
Addresses controversial issues about what it means to perceive, remember, and imagine our world. Examines research from cognitive psychology, cognitive science, and neuropsychology and includes in-class demonstrations of perceptual illusions, memory disorders, and imagery. PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOC3101). RESTRICTIONS: Open to majors and minors only.

PSYC 443 TOPICS IN ORGANIZATIONAL COMMUNICATION 3-9
Focuses on significant areas of theory and research in organizational communication. Topics may include gender, communication, or interpersonal relationships in organizations, such as superior/subordinate relationships. Crosslisted with COMM442. RESTRICTIONS: May be repeated for up to nine credits when topics vary.

PSYC 445 TOPICS IN ADOLESCENT PSYCHOLOGY 3
Analysis of physiological, psychological and social factors influencing psychological development from late childhood through adolescence. PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOC3101). RESTRICTIONS: Open to majors and minors only.

PSYC 446 PSYCHOLOGY OF MUSIC 3
Explores how subdisciplines in Psychology and Music interrelate. Topics include auditory perception, memory for music, music in therapy, development of musical abilities and social aspects of music. PREREQ: C- or better in PSYC100.

PSYC 447 PSYCHOLOGY OF THE ARTS 3
Evaluates connections between basic psychological principles and the visual and performing arts. Examines how categorization, sensation and perception, emotion and.
PREREQ: PSYC100.

PSYC 451 PROBLEMS IN YOUTH MENTAL HEALTH 3
Group work and problem-based learning are the teaching methods. Topics include prevention, child welfare, treatment, and the continuum of care in youth mental health. Graduation is based on the ability to work collaboratively with others on project groups to achieve course requirements. PREREQ: PSYC100, PSYC207, PSYC209. RESTRICTIONS: Open to Majors and Minors only.

PSYC 462 LANGUAGE ACQUISITION 3
The factors which distinguish human language from animal communication, as well as the development of many facets of language (semantics, syntax and phonology). To supplement reading and discussion, students gain research experience by working approximately eight hours per week on the on-going language acquisition projects. Crosslisted with EDUC462.

PSYC 466 ADVANCED RESEARCH 3
Participation in research program of a faculty member. Expected to contribute to conceptualization of research problems, design and methodological discussions. Normally follows PSYC366. PREREQ: Overall GPA of 3.0 and at least 18 credits in psychology. RESTRICTIONS: Requires permission of faculty member.

PSYC 468 THESIS RESEARCH 3
Independent research on a project in collaboration with faculty. Prepare and defend a formal research report. PREREQ: Overall GPA of 3.0 and at least 18 credits in psychology. 6 credits in PSYC366 and/or PSYC466. RESTRICTIONS: Requires permission of Instructor.

PSYC 481 CLINICAL PSYCHOLOGY 3
Introduction to clinical theories, research and practices. Diagnosis, classification and treatment of behavior disorders. PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOC3101). RESTRICTIONS: Open to majors and minors only.

PSYC 484 SOCIAL MOTIVATION 3
Analysis of theory and research in the social psychology of motivation. Students may choose to study either leisure behavior or work motivation. PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOC3101). RESTRICTIONS: Open to majors and minors only.

PSYC 490 SOCIAL INTERDEPENDENCE 3
Presents theoretical and empirical approaches of social psychology to the study of conflict versus cooperation between mutually dependent people. Cooperation/conflict is analyzed in terms of effects of environmental influence, reward structure of the relationship, and interpersonal values of participants. PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOCI301). RESTRICTIONS: Open to majors and minors only.
PSYC 491  PSYCHOLOGY OF TEMPORAL ORIENTATION  3
Scientific study of how temporal frames of reference regarding the past, present and future affect a variety of basic human processes, especially human behavior. PREREQ: Grades of C- or better in PSYC207, and PSYC209 or substitutes (MATH202, MATH205, STAT200, SOC1001). RESTRICTIONS: Open to majors and minors only.

PSYC 612  HUMAN PSYCHOPHYSIOLOGY  3
Introduction to psychophysiological recording techniques. Elementary anatomy and physiology of the human nervous system. Application of psychophysiological techniques to the investigation of psychopathology, information processing and social psychology. Laboratory demonstration of polygraphic measurement of autonomic and CNS variables with small computer analysis. RESTRICTIONS: Requires permission of instructor.

PSYC 626  ADVANCED NEUROANATOMY  3
Covers the functional organization of the nervous system from a clinical perspective, with emphasis on the brain stem, cranial nerves, limbic system, and cerebral cortex. Also surveys basic etiology, signs and symptoms of injury to spinal pathways, sensory-motor systems, methods of neurologic testing, and the Mental Status Exam. Crosslisted with NSC626.

PSYC 627  ADVANCED NEUROPHYSIOLOGY  3
Study of the physiology of the central nervous system, with an emphasis on the cellular and molecular basis of signal transmission in the brain. Crosslisted with BSC627.

PSYC 628  ADVANCED NEUROPHARMACOLOGY  3
Examines the actions of psychoactive drugs on neurons, neural circuits, and behavior. Focus is on drugs used in mental health, neurological disorders, and drug abuse. Crosslisted with NSC628.

PSYC 642  MENTAL REPRESENTATION AND MEMORY  3
Human memory can be conceptualized in terms of representation and information storage within various interconnected mental systems. Critically evaluates research on human memory and representation within the context of major cognitive models. May be crosslisted with CGSC642. RESTRICTIONS: Requires permission of instructor.

PSYC 668  RESEARCH  1-6
PSYC 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. Crosslisted with EDUC675.

PSYC 806  SOCIAL COGNITION  3
Focuses on the major research topics in social cognition, including their theoretical and historical roots. Topics include implicit and explicit attitudes, dual-process models of cognition and their behavioral consequences, and systematic biases in social perception. RESTRICTIONS: Requires permission of instructor.

PSYC 807  GROUP AND INTERPERSONAL PROCESSES  3
Addresses basic theoretical and empirical knowledge of group processes, structures and interactions. RESTRICTIONS: Requires permission of instructor.

PSYC 808  PERSONALITY IN SOCIAL CONTEXTS  3
Examines temporally stable individual differences ("traits") from a variety of perspectives including their origins, assessment, and relationships to behavior in social settings. Special attention is given to the interaction of trait and environmental influences on social behavior. RESTRICTIONS: Requires permission of instructor.

PSYC 809  RESEARCH DESIGN  3
An overview of methodological issues in the conduct of psychological research, including correlational, experimental, and quasi-experimental studies. Special emphasis on clinical and personality research. RESTRICTIONS: Requires permission of instructor.

PSYC 812  SEMINAR IN SOCIAL INTERDEPENDENCE  3
Examines theory and research on the conflict between self interest and collective welfare. Special attention is given to the interaction between intrapersonal motivation and features of the interdependent environment as a model for understanding the resolution of this conflict. RESTRICTIONS: Requires permission of instructor.

PSYC 813  SEMINAR IN INTERGROUP RELATIONS  3
Cognitive, motivational and cultural factors involved in the creation of and reduction of intergroup bias and conflict. Emphasis on theoretical and applied perspectives. RESTRICTIONS: Requires permission of instructor.

PSYC 814  SEMINAR IN EMPLOYEE MOTIVATION  3
Examines current research on the motivation of people at work. Special emphasis is given to the application of social psychological theory and empirical findings. Examples of topics are organizational commitment, perceived organizational support, self-efficacy, goal setting, and creativity. RESTRICTIONS: Requires permission of instructor.

PSYC 819  CHILD PSYCHOTHERAPY: ETHICS, DIVERSITY, TREATMENTS  3
The focus is on evidence-based treatments for a range of psychological disorders affecting children and adolescents. RESTRICTIONS: Requires permission of instructor.

PSYC 820  PSYCHODIAGNOSTICS: OBJECTIVE TRAIT AND BEHAVIORAL ASSESSMENT  3

PSYC 821  INTELLIGENCE AND ACHIEVEMENT TESTING  3
Administration and interpretation of major individually administered intelligence and achievement tests used in school and child clinical psychology. Five tests will be highlighted: the Stanford Binet, EISC-R, WPPSI, WAIS-R and K-ABC. RESTRICTIONS: Requires permission of instructor.

PSYC 823  LEARNING AND DEVELOPMENT  3
The study of contemporary theory and research in human development, with an emphasis on issues of educational significance, and mechanisms that affect development. Crosslisted with EDUC823.

PSYC 827  ADULT PSYCHOTHERAPY: EMPIRICALLY-SUPPORTED TREATMENTS  3
Schools, theories and techniques focusing on empirically-supported treatments in adult psychotherapy. RESTRICTIONS: Requires permission of instructor.

PSYC 829  ADVANCED PSYCHOPATHOLOGY  3
Nosology and etiology of the behavior disorders of non-organic origin. Theories of psychopathology, including various modes of conceptualizing psychopathology, i.e., medical vs. behavioral and psychosocial models. Reliability and validity of psychodiagnosis; and relevant research and problems of experimental clinical research with institutionalized populations. RESTRICTIONS: Requires permission of instructor.

PSYC 834  SUPERVISED PRACTICE IN CLINICAL PSYCHOLOGY I  1-3 PF
Limited diagnostic and therapeutic practice in clinical setting under professional supervision. RESTRICTIONS: Requires permission of instructor.

PSYC 835  SUPERVISED PRACTICE IN CLINICAL PSYCHOLOGY II  1-3 PF
Continuation of PSYC834. RESTRICTIONS: Requires permission of instructor.

PSYC 836  SUPERVISED PRACTICE IN CLINICAL PSYCHOLOGY III  1-3 PF
Continuation of PSYC834 and PSYC835. RESTRICTIONS: Requires permission of instructor.

PSYC 837  SUPERVISED PRACTICE IN CLINICAL PSYCHOLOGY IV  1-3 PF
Continuation of PSYC834, PSYC835 and PSYC836. PREREQ: PSYC836 RESTRICTIONS: Requires permission of instructor.

PSYC 838  ETHICS AND DIVERSITY IN CLINICAL PSYCHOLOGY  2
Familiarizes students with APA’s Ethical Principles of Psychologists and Code of Conduct and explores how diversity issues impact psychological functioning and the therapeutic process. RESTRICTIONS: Requires permission of instructor. Open to Psychology graduate students.

PSYC 840  TEACHING PRACTICUM  3
Preparation for being instructor of record for first course in psychology. Topics include course planning, writing syllabi, writing and grading exams, developing lesson plans, teaching writing, handling academic problems, and integrating teaching into an academic career. Read and discuss empirical research on effective teaching of psychology. Required for graduate students who wish to teach their own courses in the psychology department. RESTRICTIONS: Open only to graduate students in psychology.
**PSYC 841**  Teaching Fellowship  
Supervised teaching in psychology. Open to graduate students teaching a first course as an instructor of record. Activities include weekly 1 hour discussion and class visits by faculty supervisor.  
**PREREQ:** PSYCB40  
**RESTRICTIONS:** Requires permission of instructor.

**PSYC 843**  Developmental Seminar  
Seminar on recent issues and developments in developmental psychology.

**PSYC 845**  Childhood Psychopathology  
Survey of various developmental and behavioral disorders in childhood. Seminar will examine the issues of diagnosis and treatment theoretical perspectives. Special emphasis on current major psychological research. Crosslisted with EDUCB13.  
**RESTRICTIONS:** Requires permission of instructor.

**PSYC 860**  Psychological Statistics  
Applications to behavior measurement of probability, regression and analysis of variance and covariance; psychometrics and scale design, and of design of experiments.  
**RESTRICTIONS:** Requires permission of instructor.

**PSYC 861**  Psychological Statistics  
Further follow-up to ANOVA focusing on an introduction to applied regression for the behavioral and social sciences.  
**RESTRICTIONS:** Requires permission of instructor.

**PSYC 864**  Teaching Practicum in Psychology  
Prepares graduate students in psychology to teach undergraduate courses. Topics include course design, active learning techniques, effective lecturing, teaching, writing, student assessment, campus resources, and teaching philosophies and portfolios.  
**RESTRICTIONS:** Requires permission of instructor.

**PSYC 865**  Emotions Seminar  
Discusses articles that interest students in different specialties and that have the potential to help set new directions in emotion science. Articles for discussion are selected on the basis of members' interests.  
**RESTRICTIONS:** Open to Psychology graduate students only. Need permission of instructor.

**PSYC 868**  Research  

**PSYC 869**  Master's Thesis  
**RESTRICTIONS:** Requires department permission.

**PSYC 878**  Hierarchical Linear Modeling  
Introduction to the basic concepts and theory underlying hierarchical linear modeling.

**PSYC 879**  Structural Equation Modeling  
Introduction to theory and application of structural equation models and a foundation in SEM methodology. Focus is also on use of commonly available software to perform statistical analyses.  
**PREREQ:** PSYC860  
**RESTRICTIONS:** Requires permission of instructor.

**PSYC 964**  Pre-Candidacy Study  
Research and readings in preparation of dissertation 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.

**PSYC 969**  Doctoral Dissertation  

**RUSS 105**  Russian I - Elementary  
Introduction to the Russian language and development of speaking, listening, reading and writing skills through the use of basic texts.

**RUSS 106**  Russian II - Elementary/Intermediate  
Completion of basic Russian. Increasing mastery of the basic skills of speaking, listening, reading and writing.  
**PREREQ:** RUSS105  
**RESTRICTIONS:** Two to three years of high school Russian acceptable in lieu of prerequisite.

**RUSS 107**  Russian III - Intermediate  
Review of grammar, continued practice in speaking and writing, and reading texts of average difficulty.  
**PREREQ:** RUSS106  
**RESTRICTIONS:** Four years of high school Russian acceptable in lieu of prerequisite. Satisfies College of Arts and Sciences language requirement.

**RUSS 200**  Russian Grammar Review  
Systematic review of elementary and intermediate Russian grammar, study of complex sentence structure and idioms. Some conversational practice.  
**PREREQ:** RUSS107

**RUSS 205**  Russian Conversation  
Practical use of the language. Emphasis on topics drawn from contemporary Russian life and literature.  
**PREREQ:** RUSS107

**RUSS 211**  Russian Reading and Composition: Short Fiction  
Reading and discussion of 20th-century Russian short stories and novellas. Several short compositions. Grammar review where appropriate.  
**PREREQ:** RUSS107

**RUSS 305**  Russian Conversation and Composition  
Discussion of current cultural, social and political topics in Russia and the former republics. Vocabulary building, grammar exercises and frequent compositions.  
**PREREQ:** Any 200-level course conducted in Russian

**RUSS 310**  Introduction to Russian Literature I  
Masterpieces of poetry, narrative prose and drama from the 19th century.  
**PREREQ:** RUSS211 or RUSS305

**RUSS 312**  Introduction to Russian Literature II  
Masterpieces of poetry, narrative prose and drama from the 20th century.  
**PREREQ:** RUSS211 or RUSS305

**RUSS 325**  Russian Civilization and Culture  
Survey of the major cultural, social and political developments in Russia from its inception to the present.  
**PREREQ:** RUSS211 or RUSS305.

**RUSS 366**  Independent Study  

**RUSS 401**  Advanced Russian Grammar and Composition  
Selected topics in advanced Russian grammar, with special attention to participial constructions, verbs of motion, aspect and problems of syntax and word order. Exercises in writing correct and idiomatic Russian.  
**PREREQ:** One 300-level Russian course

**RUSS 440**  Special Topics: Russian Drama, Prose or Poetry  
Explores one of the three major genres by examining a specific theme. See http://primus.nss.udel.edu/CoursesSearch/ for topics.  
**PREREQ:** Any two 300-level Russian courses  
**RESTRICTIONS:** May be repeated for credit when topics vary.

**RUSS 455**  Selected Authors, Works and Themes  
Works of one or more outstanding authors or on a special theme.  
**PREREQ:** Two 300-level Russian literature courses  
**RESTRICTIONS:** May be repeated for credit when topics vary.

**RUSS 465**  Seminar  
Various authors and themes.  
**PREREQ:** One 400-level Russian literature course  
**RESTRICTIONS:** May be repeated for credit three times when topics vary.

**RUSS 466**  Independent Study  

**RUSS 665**  Seminar  
Various authors and themes.  
**RESTRICTIONS:** May be repeated for credit when topics vary.

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**SCIENCE**

**SCEN 101**  Physical Science  
Structure, processes and concepts of the physical world. Focus is physical sciences topics presented to a general science class consisting of non-science majors. Laws and theories of the physical world are presented and applied to applications, including motion, gravity, energy, waves, light, electricity including photoelectricity, and magnetism.  
**RESTRICTIONS:** Requires high school algebra. For non-science students with no physics or chemistry background. Not for physics or chemistry major credit. Only one course from among SCEN101, PHYS201 or PHYS207 can count toward graduation.

**SCEN 102**  Physical Science  
The structure, processes and concepts of the physical world.  
**RESTRICTIONS:** Requires high school algebra. For non-science students with no physics or chemistry background. Not for physics or chemistry major credit. Only one course from among SCEN102, PHYS202 or PHYS208 can count toward graduation.
SCEN 103 CONCEPTS OF SCIENCE AND TECHNOLOGY 3
Introduction to some of the fundamental science concepts underpinning high technology, emphasizing everyday devices and practical experience, for the development of scientific and computer literacy of non-science majors.
RESTRICTIONS: Requires high school algebra.

SCEN 105 SCIENCE ON THE SCENE 4
An investigative look at local environments where topics such as microbiology, chemistry, ecology, and plant and soil sciences converge. Students will learn the basics of research, survey, and experimental design in the context of local ecosystems.

SCEN 107 SNACK SCIENCE 4
An overview of topics from introductory biology, chemistry, and physics focusing on their applications to food and cooking. Emphasis will be placed on the use of the scientific method as a critical thinking tool through the use of laboratory experiments and problem-based learning. May be crosslisted with ANFS107.

SCEN 109 ART OF BOTANY 4
An introduction to how plants are intimately linked with the visual arts through exploration of their aesthetic value and the biological, chemical, and physical properties of plant-derived compounds and materials used as artistic media.

SCEN 111 REVOLUTIONARY SCIENCE 4
Student-centered exploration of six of the most revolutionary scientific controversies and resulting theories that changed our lives and the future of the human race forever. Students’ exploration will be encouraged through activities such as reading primary literature and debates as well as hands-on laboratory investigations.

SCEN 115 ORIGAMI SCIENCE FABLAB/MAKERSPACE 4
Learn origami and its application in science and technology. Expressions, using origami, of select concepts and methods in Mathematics, Computer Science, Physics, Biology, and Chemistry will be engaged in the classroom. Students will create structures, write about them, and present them in a gallery.

SCEN 117 CITIZEN SCIENCE 4
Engages diverse participants on local, regional, national, and global scales in the collection, interpretation, and use of scientific data on a particular scientific problem. We will engage students in a variety of citizen science projects including at least one of their own.

SCEN 119 TRANSFORMING SOLAR ENERGY 4
Lab- and project- focused exploration of solar energy and its uses. Biology, chemistry and physics concepts are introduced in context, leading to critical analysis of efficiency and economics of different technologies.

SCEN 210 SCIENCE OF COLOR PHENOMENA 4
Introduction to basic physical and chemical principles which describe nature of light and the phenomena of color. Targeted for non-science majors who seek a descriptive understanding of scientific principles underlying formation of color phenomena found in nature and works of art. Crosslisted with ARTC210. PREREQ: High school chemistry and algebra.

SCEN 340 ADVANCED SCIENCE FOR TEACHERS 4
Provides advanced background study for students in the Elementary Teacher Education Milford Program. Topics are drawn from physical, earth and biological sciences and build on science courses previously taken in the program. The areas of science outlined in the State Science Performance Indicators are covered. Along with lecture/discussion, students have hands-on laboratories (including the Smithsonian kits used by the District). RESTRICTIONS: Offered to students in the Milford ETE program.

SCEN 344 SCIENCE AND RELIGION 3
Examines the relationship between science and religion and focuses on: whether our current cosmological picture of the Big Bang allows for a Creator; the rationality of miracle-reports; whether the scientific image of humanity is compatible with a religious worldview; the biological evolution/creation debate. Crosslisted with PHIL344.

SCEN 466 INDEPENDENT STUDY 1-12

SCEN 491 TEACHING SCIENCE IN SECONDARY SCHOOLS 4
Techniques, approaches and preparation for teaching science in high school and middle school. Laboratory meets one full morning per week in local high schools and middle schools for observation and initial teaching. COREQ: EDUC420 for chemistry education and biology education majors.

SCEN 492 STUDENT TEACHING SEMINAR: SECONDARY SCIENCE 3 PF
Methods, techniques and problems in student teaching in secondary schools and their solutions. Assertiveness, authority, management, strategies and teaching for understanding. COREQ: EDUC400

SCEN 540 ENERGY ACROSS SYSTEMS FOR SECONDARY EDUCATORS 3
Standards-based format challenges and extends the content knowledge of practicing science teachers, grades 6-10, and examines critical topics in significant depth in a problem-based setting. Themes include solar energy, heat, light, electrical power generation, energy transformation, photosynthesis, and energy conservation.
RESTRICTIONS: Intended for practicing teachers.

SCEN 541 THE NATURE OF MATTER FOR SECONDARY EDUCATORS 3
Standards-based format challenges and extends the content knowledge of practicing science teachers, grades 6-10, and examines critical topics in significant depth in a problem-based setting. Themes include the particle model, atomic structure, chemical reactions, and energy transformations including photosynthesis.
RESTRICTIONS: Limited to practicing teachers.

SCEN 545 QUANTITATIVE LITERACY/SCIENTIFIC INQUIRY FOR SECONDARY EDUCATORS 3
Standards-based format challenges and extends the content knowledge of practicing science teachers, grades 6-10, and examines critical topics in significant depth in a problem-based setting. Themes include the relationship between evidence and inference, measurement errors, data representations, from the viewpoint of mathematics and science.
RESTRICTIONS: Limited to practicing teachers.

SCEN 569 DELAWARE'S ECOSYSTEMS 3
Presents the basics of ecosystem structure and function while comparing Delaware’s major ecosystems. Integration with ecosystem and wetland kits, science standards and performance indicators; use of field technology; associated environmental issues. Lecture and discussion supplement outdoor studies in meadow, forest, stream, and estuary ecosystems.

SCEN 650 SCIENTIFIC INQUIRY FOR CURRENT AND FUTURE TEACHERS 3
Advanced problem-based learning and scientific research course for Elementary Teacher Education majors seeking a second licensure area in middle school science. May also be taken by current middle school and high school teachers. Topics rotate among life, earth, and physical sciences.

SEXUALITIES AND GENDER STUDIES

SGST 156 THE SURPRISING AND FASCINATING STORY OF AMERICAN SEXUALITIES 3
Learn about the history of American sexuality and its importance to our politics and culture today. We will examine a variety of topics: the history of marriage and the family, pregnancy and childbirth, contraception, abortion, rape, prostitution, erotica/pornography, sexual reform and sexual purity, movements, sexuality and racial conflicts, sex during wartime, transsexuality, same-sex desires and communities, the sexual politics of women’s emancipation, sexual diseases, sex education, sexual liberation, and the gay rights movement. Crosslisted with HIST156.

SGST 200 CULTURAL INTRODUCTION TO SEXUALITIES AND GENDER STUDIES 3
An exploration of the variations in the social construction of lesbian, gay, bisexual, heterosexual, transsexual, transgender and queer identities and communities in contemporary American society through study of gay literature, history, theory, religious and legal issues and the arts including film, music, television, and visual arts.
May be crosslisted with WOMS200.

SGST 208 CURRENT ISSUES IN SEXUALITY AND GENDER LECTURE SERIES 1-3
Lecture series in which faculty and guest speakers discuss their research on contemporary and historical perspectives on sexuality and gender. Research presented from several disciplines, including sociology, history, literature, art, music, anthropology and psychology, among others.
May be crosslisted with WOMS208. RESTRICTIONS: May be repeated for credit when topics vary.

SGST 266 SPECIAL PROBLEM 1-3
SGST 301  Gay and Lesbian Film  3
Explores gay and lesbian issues represented in film and an academic analysis of these issues. Through film, students study the social constructs of sexuality and gender, analyze the role of homosexuality, examine the development of gay and lesbian characterization, and explore the differences between sex and sexuality. May be crosslisted with WOMS301.

SGST 308  Theories of Sexuality and Gender  3
Examines the major theoretical approaches to the study of sexuality and gender with an emphasis on queer theory and interactions between sexuality, gender, race, class, and nationality. May be crosslisted with POSC308, WOMS308.

SGST 366  Independent Study  1-6

SGST 387  History of Sexuality in the U.S.  3
A survey of American sexual ideals, practices, and identities, from the Colonial period to the present. How anxieties about interracial sex shaped life in the American South, how the advent of more reliable contraceptives provoked both social movements and political debate, and how the emergence of a scientific discourse of sexual difference simultaneously propelled the gay rights movement and enabled scientists to categorize same-sex love as pathology and perversion. Crosslisted with HIST387.

SGST 420  Race and Sexuality  3
Examine sexuality as a structure of power and identity. Study how race is sexualized and sexuality is racialized. Explore the impact of binary thinking (white/non-white, straight/gay) on social relationships. The perspective of racial minorities, particularly African-Americans, is emphasized. Review research on culture, history, and policy. Crosslisted with SOC210. PREREQ: SOC201

SGST 425  Sociology of the Body  3
Examines the body, not through the lens of the biological sciences, but as the product of complex social arrangements and processes. Considers: What is 'natural' about bodies? How are bodies commodified? How are bodies categorized and constituted by discourses of race, class, gender, sexuality, and biomedicine?. Crosslisted with SOC425. RESTRICTIONS: Not open to freshmen.

SGST 466  Special Problem  1-6

SGST 498  Internship in Women's Studies  3
Students work 115 hours per semester in an agency or program associated with women's and/or gender issues. Academic knowledge is applied to actual work situations. Seminar discussions focus on service learning in light of research and theory. Crosslisted with WMS498. PREREQ: Any 200-level women's studies course. RESTRICTIONS: Requires permission of instructor. May be repeated once for credit.

SOCIOLOGY

SOCl 201  Introduction to Sociology  3
An overview of the sociological perspective of the study of society, social organization and social institutions with special emphasis on the social causes and consequences of human behavior.

SOCl 203  Self and Society  3
An introduction to one of Sociology's major microtheoretical perspectives-symbolic interactionism (SI)—to look at the micro-level building blocks of society by focusing on situated interaction and the meanings it conveys, creating patterns of behavior and collective understandings. PREREQ: SOC201

SOCl 204  Urban Communities  3
Urbanization, rural-urban social differences and the organization of urban communities by race, class, ethnicity and stage in the life cycle. May be crosslisted with BAMS204.

SOCl 206  Women and Work  3
Covers a variety of topics including women in traditional and non-traditional occupations, gender-based discrimination (wage inequities, sexual harassment, exclusionary policies), the contributions of women to the economy and the role of law in shaping conditions for women in the workplace. Crosslisted with WOMS206.

SOCl 209  Social Problems  3
Topics may include poverty, intergroup conflicts, war, mental illness, aging, adolescence and environmental pollution.

SOCl 211  Men, Conflict and Social Change  3
Examination of male roles and images in society, utilizing an interdisciplinary social science perspective. Topics include the family, work, military, violence and the implications of feminism for men. Issue oriented. Crosslisted with WOMS211

SOCl 213  Men and Women in American Society  3
Designed to provide students with a sociological framework for analyzing sex and gender relations in contemporary American society. Topics include the social construction of gender, patterns of sex-role socialization, gender stratification in the paid work force, gender relations in the family and other social institutions. May be crosslisted with WOMS213.

SOCl 215  Race in Society  3
Examination of the social construction of race and its importance in institutions and social identity. History of race in the United States, including access to rights and privileges and how groups worked for racial equality. and how race structures relationships among diverse groups in society. Includes analysis of rights and privileges denied or extended to groups and how disadvantaged groups work towards racial equality. May be crosslisted with BAMS215.

SOCl 220  Sociology of Popular Culture  3
Study the political economy of production; textual analysis; consumption and celebrity and fandom. Also, examine advertising, the effect of popular culture on violence and misogyny, and the effect of popular culture on identity, especially that of women and racial and sexual minorities.

SOCl 266  Special Problem  1-3

SOCl 270  Families and Developmental Disabilities  3
Focuses on people with developmental disabilities in the context of their family and culture from a multidisciplinary perspective. Covers disabilities and their causes; changing needs across the lifespan, gender, cross-cultural and legal issues; and information about prevention/intervention, employment, inclusion, and empowerment. Crosslisted with HDFS270.

SOCl 301  Introduction to Sociological Research  4
Survey of research methods and data analysis employed in sociology. PREREQ: SOC201 and completion of the College of Arts and Sciences math requirement.

SOCl 302  Social Deviance  3
Defining deviance, research on deviance and explaining deviance. May be crosslisted with CRJU302.

SOCl 303  Juvenile Delinquency  3
Historical definition of delinquency, abuse and neglect, research in delinquency, causes and treatment of delinquents. May be crosslisted with CRJU303. PREREQ: SOC201 or SOC209.

SOCl 304  Criminology  3
The nature, kinds and causes of crime. Criminal liability, criminal careers and organized racketeering.

SOCl 305  Social Class and Inequality  3
This course investigates the social structural hierarchical positions groups hold relative to the economic, political, social, and cultural resources of the society. PREREQ: SOC201.

SOCl 308  The Family  3
Comparative study of the family in various societies provides a background for the analysis of family organization in modern America. PREREQ: SOC201 or SOC203 or SOC209.

SOCl 311  Sociology of Health & Illness  3
Overview of the many contributions medical sociologists have made to our understanding of the determinants of health, the organization and implications of medical care, the roles of doctors and patients, and the intersections between social change in society and in medicine.

SOCl 312  Theories of Society  3
Covers writings of Karl Marx, Emile Durkheim, Max Weber and related current approaches. Focuses on theoretical perspectives concerned with social development, social conflict, solidarity, social class and gender. PREREQ: SOC201.
SOCI 313 MENTAL HEALTH & WELL-BEING 3
This course will explore major concepts and measurements within mental health research, contemporary mental health services and treatments, the role of stigma and the social context of mental illness, as well as practices within positive psychosocial well-being.

SOCI 315 CHILDHOOD AND SOCIETY 3
This course takes a sociological view of childhood and children's lives, including topics such as: historical development and variability of the category of childhood, inequality among children, educational systems, children's experiences with social institutions and childhood peer relations.

SOCI 319 SOCIOLOGY OF LATIN AMERICA 3
Survey of sociology of Latin America, with sections on geography, population, urbanization, history, politics, family, religion, economy, and education and on race, class, and gender relations.

SOCI 322 CROWDS, CULTS AND REVOLUTIONS 3
Analysis of forms of behavior in relatively unstructured situations such as crowds, panics, riots and demonstrations; and processes of interaction: susceptibility, contagion, polarization and communication. May be crosslisted with CRJU322. PREREQ: SOCI201

SOCI 323 SOCIOLOGY OF RISK 3
Focuses on how individuals, organizations, and government agencies assess various types of risk and act with respect to those assessments. Topics include: risk perception, risk assessment, risk management under conditions of scientific uncertainty, and public debates about safety.

SOCI 324 ISSUES IN EMERGENCY MANAGEMENT 3
Overview of the development of emergency management in the United States, including the formation of the profession, integration of formal and informal organizations, crisis response, and perceptions of crime and deviance during emergencies. May be crosslisted with CRJU325.

SOCI 325 DISASTERS AND SOCIETY 3
Sociological introduction to the field of disaster studies, including the ways in which societies attempt to prepare for, respond to, and recover from their impacts.

SOCI 328 SOCIOLOGY OF WORK 3
The organization of work, including social, institutional, and cultural influences. Special emphasis on problem areas such as technology, labor relations, and the challenges of a global economy. PREREQ: SOCI201

SOCI 329 INTERNATIONAL MIGRATION 3
Interdisciplinary introduction to alternative/complementary disciplinary approaches to the study of human movement between states. Offered on a rotational basis by faculty involved in the University of Delaware migration group. Crosslisted with POSC329.

SOCI 335 ENVIRONMENT AND HEALTH 3
Couched in the sociological perspectives of Embodied Health Social Movements (EHM), popular epidemiology, and environmental justice, this course examines how sociologists are studying human health and health disparities as a result of disproportionate exposure to environmental burdens.

SOCI 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. Crosslisted with CRJU336.

SOCI 340 GLOBAL POLICY AND INEQUALITY 3
Explores the relationship between social policy and social inequality in the U.S. and comparable societies. Focuses on public policy and the role of NGOs in social service delivery. Specific social policy areas include employment, family, health care, education, social security, welfare, and affirmative action policies.

SOCI 341 WELFARE AND SOCIETY 3
Review of social welfare provision including state interventions, private charitable service delivery, and non-profit social services. Methods of social work practice and the administration and evaluation of social welfare provisions.

SOCI 343 SOCIETY, POLITICS AND HEALTHCARE 3
Interdisciplinary study of socio-political and humanistic issues of healthcare and health policy, in the US and abroad. Students will engage with how policy and politics influence the healthcare delivery system and its consumers.

SOCI 345 SOCIOLOGY OF LAW 3
Analysis of law as a social process in both historical and comparative perspective. Focuses on various theories of law and society and relevant empirical research. May be crosslisted with CRJU345.

SOCI 348 THEORIES OF SOCIAL WORK PRACTICE 3
Methods of social work practice; casework, group work, community organization; sociological and psychological foundations underlying social services. PREREQ: SOCI201

SOCI 349 AGING & SOCIETY 3
Historical, social, and cultural context influence everything from the meaning of growing old, the rate of development and the rate of age-related decline, to the meaning and significance of death and dying. Introduces students to the nature and the study of human aging. May be crosslisted with HDFS349.

SOCI 350 SOCIAL INEQUALITY AND FILM 3
Using a sociological framework for understanding equality, major films are used to explore the depictions and representations of race, gender, sexuality and social class issues. Examines the ideologies presented in films, the contexts that create them and how they contrast with social realities. PREREQ: SOCI201

SOCI 356 INEQUALITY, CRIME AND JUSTICE 3
Introduction to challenges in addressing crime in multiracial, multiethnic, class-stratified society. This context serves as backdrop for inquiry into crime causation, operations of the criminal justice system, and experiences of relevant actors. Crosslisted with CRJU355.

SOCI 360 SOCIOLOGY OF RELIGION 3
Sociological analysis of religious practices and beliefs that are practiced in the contemporary United States, including changes in religious affiliation and the effect of religion on social change, political behavior, gender roles, sexuality, racial inequality, and cultural membership. May be crosslisted with JWST360.

SOCI 361 RACIAL INEQUALITY 3
A detailed examination of racial inequality, including the social construction of race, the nature of oppression and advantage, government policies and resistance strategies. There will be attention to the status of men and women and social class diversity within racial-ethnic communities. May be crosslisted with BAMS361. PREREQ: SOCI201

SOCI 366 INDEPENDENT STUDY 1-3

SOCI 368 INDEPENDENT RESEARCH 1-6
Independent research under the supervision of a faculty member. Requirements include preparation of a research report consistent with the professional literature in the field. Student and faculty member will file a learning contract describing the research and a report with the department chair. RESTRICTIONS: Requires permission of instructor.

SOCI 369 ALCOHOL, DRUGS AND CRIME 3
Examines the relationship between alcohol, drugs and crime, including societal response to offenders who commit alcohol/drug related offenses and offenders who engage in crime over drug markets. Crosslisted with CRJU369. PREREQ: CRJU110 or SOCI201

SOCI 370 PRISON AND PRISON SUBCULTURES 3
Provides an intensive examination of the social organization of prisons. Mainly examines how the prisoner subculture shapes and is shaped by social institutions. Special emphasis on how gender and race contribute to differential patterns of adjustment to incarceration. Crosslisted with CRJU370.

SOCI 375 SOCIOLOGY OF DIAGNOSIS 3
Diagnosis is central to medicine. Sociologists are interested in how diagnoses and illness categories are socially constructed, applied, and serve to organize society into the healthy and the ill. This class examines the way that medical diagnoses are shaped and their powerful role in society.

SOCI 399 PRACTICUM: TEACHING SOCIOLOGY 3 PF
Practical experience in undergraduate education is gained by serving as a discussion leader in a course taught by a regular member of the faculty. RESTRICTIONS: Requires permission of instructor. Not for major credit.
### SOCI 401  **SENIOR SEMINAR**  
3  
Culminates the legal studies minor by requiring an independent research project resulting in a term paper. Seminar focuses on a specific substantive issue, provides guidance from professor and chance to share ideas and problems with fellow students. Crosslisted with LEST401.

### SOCI 407  **SOCIOLGY OF SEX AND GENDER**  
3  
Seminar on sex and gender relations from a sociological perspective. Surveys current research on gender stratification in the paid work force, the feminization of poverty, gender relations in the family, sexual violence, and feminism as a social movement. Special attention given to current theoretical debates on the origins and persistence of sexual inequality and the intersection of gender with race and class in patterns of social stratification. May be crosslisted with WOMS407. PREREQ: SOC1201, and either SOC213 or WOMS201. RESTRICTIONS: Restricted to junior and senior sociology and women's studies majors.

### SOCI 408  **DOMESTIC VIOLENCE POLICY AND PREVENTION**  
3  
Reflects the current state of policy and practice among policy makers and practitioners in the field of domestic violence including legal issues, policy development, primary prevention, and models of best practice. Addresses the role of federal and state law. May include economic justice, mental health and trauma, and alternative models. Crosslisted with WOMS408. PREREQ: Any 200-level Women's Studies course.

### SOCI 410  **HEALTH SERVICES PRACTICUM AND SEMINAR**  
4 PF  
Field experience and related seminar. Placement in health service settings where student works for about 160 hours under supervision of health service administrators. Students meet in a weekly seminar with coordinator. RESTRICTIONS: Requires permission of instructor.

### SOCI 413  **RACE AND HEALTH**  
3  
Examines the health status of socially disadvantaged racial and ethnic groups in the US. Attention will be focused on the patterned ways in which the health of these groups is embedded in the social, cultural, political, and economic contexts, and arrangements of US society. May be crosslisted with BAM5431.

### SOCI 415  **RACE, CLASS, AND GENDER**  
3  
Analysis of current American social issues that show interrelationship of race, class and gender. Readings from sociology, Afro-American studies, feminist studies, history and literature. May be crosslisted with BAM5415, WOM5415.

### SOCI 416  **SOCIAL THOUGHT AND CONTEMPORARY SOCIETY**  
3  
Seminar focuses on ways in which social thought defines and analyzes contemporary society. Explores how alternative theories and methods serve to create knowledge about contemporary concerns with everyday life, democracy, equality, social structure and power. PREREQ: SOCI312.

### SOCI 417  **SEX CRIMES AND PUNISHMENTS**  
3  
Discuss controversial topics surrounding sex crimes and punishments to develop students' abilities to think critically about connections between three areas: how we as a society respond to crime through our criminal justice systems; what we believe about crime and punishment; and what empirical research tells us. Crosslisted with CRJU417.

### SOCI 418  **RACE, GENDER, AND POVERTY**  
3  
An examination of contemporary American poverty with attention to race and gender as fundamental dimensions of inequality. Social policy, employment and family composition are key topics. May be crosslisted with BAM5418, WOM5418. PREREQ: SOCI201.

### SOCI 420  **RACE AND SEXUALITY**  
3  
Examine sexuality as a structure of power and identity. Study how race is sexualized and sexuality is racialized. Explore the impact of binary thinking (white/non-white, straight/gay) on social relationships. The perspective of racial minorities, particularly African-Americans, is emphasized. Review research on culture, history, and policy. May be crosslisted with BAM5420, SGST420, WOM5412. PREREQ: SOCI201.

### SOCI 424  **WOMEN IN LITERATURE AND SOCIETY**  
3  
This INSIDE/OUT class focuses on deep reading of several form of literature. The class investigates the role of women in literature as authors, readers and central characters, and uses literature as a window into social views of gender. Assigned material explores the particular themes of voice, agency, cultural difference and social structure. Crosslisted with CRJU424. RESTRICTIONS: Permission of instructor.

### SOCI 425  **SOCIOLOGY OF THE BODY**  
3  
Examines the body, not through the lens of the biological sciences, but as the product of complex social arrangements and processes. Considers: What is 'natural' about bodies? How are bodies commodified? How are bodies categorized and constituted by discourses of race, class, gender, sexuality, and biomedicine? May be crosslisted with SGST425, WOMS425. RESTRICTIONS: Not open to freshmen.

### SOCI 426  **EMERGENCY AND ENVIRONMENTAL MANAGEMENT PRACTICUM AND SEMINAR**  
4 PF  
Internship in an organization or agency responsible for emergency or environmental management. With approval of the area coordinator, student is assigned to an organization to become familiar with issues, policies and practices pertaining to disasters. Student under direct supervision of agency personnel while in the placement position. In addition to the internship, students are expected to meet weekly in a seminar with the area coordinator and other students to discuss issues and experiences. PREREQ: SOCI324, SOCI325 or SOCI470. RESTRICTIONS: Approval of the area coordinator.

### SOCI 428  **CORPORATE CRIME**  
3  
Nature and causes of the deviant behaviors and crimes of large organizations. How organizations act, are accused of deviance and defend themselves in cases such as price-fixing, sale of unsafe drugs and illegal spying. May be crosslisted with CRJU428.

### SOCI 430  **COMPARATIVE SOCIOLOGY**  
3-6  
Examines sociological similarities and differences between the United States and a selected country on a number of critical sociological topics. Topics include ethnic and religious diversity, culture, demographic structure, social institutions, social stratification and urbanization.

### SOCI 432  **HIV/AIDS AND CRIME IN SOUTH AFRICA**  
3  
Examines two major social problems in South Africa: crime and HIV/AIDS. Explore the problems historically, as well as their current prevalence and implications for the country. Examines sociological theories to broaden our understanding of the social problems which are compared with the US.

### SOCI 433  **GENDER AND HEALTH**  
3  
Why are women sicker, but men die younger? In this course we will critically examine the relationship between gender and health. In doing so, we will also consider the contribution of race, class and sexuality in shaping that relationship. May be crosslisted with WOMS433. RESTRICTIONS: Not open to Freshmen due to the rigorous seminar format, higher-order thinking, and writing requirements in the course.

### SOCI 441  **SOCIAL WELFARE PRACTICUM AND SEMINAR**  
4 PF  
Field experience and related seminar. Placement in social service agencies where students work for approximately 160 hours under professionally trained supervisors; students meet in a weekly seminar with coordinator. PREREQ: SOCI341. RESTRICTIONS: Requires permission of instructor.

### SOCI 442  **LAW AND SOCIETY PRACTICUM AND SEMINAR**  
4 PF  
Field experience and related seminar. Placement in court, law firm or other law-related institution where students work for approximately 160 hours under professionally trained supervisors; weekly seminar with program coordinator. PREREQ: SOCI/CRJU345. RESTRICTIONS: Requires permission of instructor.

### SOCI 444  **APPROACHES TO QUALITATIVE INQUIRY**  
3  
Explores such approaches to research as conducting interviews, observing social behavior, content analysis of such material items as films, newspapers, and historical documents, and conducting focus groups. Given opportunity to choose a project and conduct research using these qualitative methods.

### SOCI 449  **SOCIOLOGY OF ART AND CULTURE**  
3  
Introduction to sociological perspectives on culture and the arts. Topics include the role of culture in the creation of social inequality, fashion, the social production of art, the culture industry, and outsider art. May be crosslisted with MC3149.

### SOCI 450  **POLITICS AND SOCIETY**  
3  
Analysis of political organization and action, including evaluation of major approaches. Case studies of political structures and behavior. PREREQ: SOCI201.
SOCI 452  **DRUGS AND THE CRIMINAL JUSTICE SYSTEM**  3
Covers both drug and criminal justice issues, focusing on the drugs-crime nexus and the criminal justice system response. Examines issues of race, gender, victimization, international policy, and new policy responses including drug treatment, harm reduction, and restorative justice. Class is held at a local correctional facility, and half the students are inmates. Crosslisted with CRJU452. RESTRICTIONS: Permission of instructor.

SOCI 455  **YOUTH STREET OUTREACH**  4
Implements an outreach program to youth in a low income, urbanized community in Wilmington. Students trained and monitored as outreach workers by their professor and by community volunteers. Outreach workers trained to approach youth hanging out on the street, engage them (through conversation and recreational activities), identify their needs, and direct them to resources. Students keep journals to record their observations and feelings. The goal of the class is to increase social capital among youth by encouraging and facilitating youth participation in community educational, recreational, and social support services/activities. May be crosslisted with BAMS455, CRJU455, UAPP455.

SOCI 464  **INTERNSHIP**  1-4 PF
Provides students an opportunity to apply sociological theory and research while working in an agency or other organizational setting under supervision of department faculty. Must complete an internship agreement and secure approval from faculty member to sponsor internship.

SOCI 466  **INDEPENDENT STUDY**  1-3

SOCI 470  **ENVIRONMENTAL SOCIOLOGY**  3
A substantive and theoretical introduction to the major issues in environmental sociology: the emergence and development of the environmental movement; the development of environmental issues; and how environmental issues are related to structural, contextual and perceptual factors. RESTRICTIONS: Requires upper division status.

SOCI 471  **DISASTERS, VULNERABILITY & DEVELOPMENT**  3
Introduces students to social vulnerability analysis of disaster. Students examine how social, geographical, and cultural factors as well as patterns of development put people differentially at risk to disasters. Emphasizes the intersection of gender, race, class, age, and ability. Disasters in the US are compared and contrasted to international disasters. Students will explore how vulnerable social groups are affected by and cope with hazardous conditions and events, as well as study the capacities of these groups to increase resiliency. Readings draw from disaster studies, feminist studies, and development studies.

SOCI 495  **FIELD EXPERIENCE IN CRIMINAL JUSTICE**  4 PF
Practicum involving actual field experience in a criminal justice agency; e.g., law enforcement, courts or correctional agencies. Emphasis on relating the field experience to academic work. Crosslisted with CRJU495. RESTRICTIONS: Requires permission of instructor. Not for major credit.

SOCI 496  **PRACTICUM IN TEACHING**  1-3 PF
Practical exposure to undergraduate education gained by assisting a member of the faculty in carefully supervised experiences such as discussion leader, crafting questions, consulting with students. Students may not be involved in the grading of student work or the assignment of grades. May be repeated for up to three credit hours. RESTRICTIONS: Requires permission of instructor. Not for major credit.

SOCI 605  **DATA COLLECTION AND ANALYSIS**  3
A survey of methods and techniques for defining research problems and for gathering and analyzing data in sociological research. RESTRICTIONS: Requires permission of instructor.

SOCI 606  **QUALITATIVE METHODS**  3
Focuses on research design, the logic of inquiry and an elaboration of selected issues introduced in SOCI605. Special emphasis on epistemological issues, methodological concerns central to the social sciences and non-positivist research strategies and techniques.

SOCI 607  **SOCIOLOGY OF GENDER**  3
Reviews current research and theory in the sociology of gender with particular attention to issues arising from the gender division of labor, feminism and social change, gender and the structure of social institutions, and the interaction of gender, race, class and sexuality. Introduces sociological theory and methodology as used and revised by scholars working on gender issues.

SOCI 608  **GENDER, WORK AND FAMILIES**  3
Brings together studies of the workplace and studies of the family with special focus on areas of overlap. Analysis of gender roles and the work/family overlap as well as focused discussion on issues of family policy. RESTRICTIONS: Requires permission of instructor.

SOCI 612  **DEVELOPMENT OF SOCIOLOGICAL THEORY**  3
Historical survey of the development of sociology and sociological theory beginning with the period of the Social Contract theorists through the classic European theorists of the 19th century.

SOCI 614  **ADVANCED DATA ANALYSIS**  3
Methods of analyzing data in sociological research focusing on multivariate approaches. PREREQ: SOCI605

SOCI 615  **RACE, CLASS AND GENDER**  3
Examines how race, class, and gender structure United States' social institutions and shape contemporary social issues.

SOCI 621  **THEORIES AND APPROACHES IN SOCIAL DEVIANC E**  3
General and specific theoretical orientations in the analysis of social deviance.

SOCI 622  **COLLECTIVE BEHAVIOR**  3
Process and mechanisms operating in panics, riots, demonstrations and other disruptions of social order.

SOCI 625  **ADVANCED SOCIAL STATISTICS**  3
The application of advanced statistics to social science research questions and data, including the use of longitudinal modeling, multilevel modeling, structural equation modeling, cluster solutions, models for categorical and limited dependent variables, and others as appropriate. PREREQ: SOCI 614 or Instructor Consent.

SOCI 630  **JUVENILE JUSTICE AND INEQUALITY**  3
In this course students use a sociological perspective to study the punishment of and inequality among youth. There is a particular focus on how youth are treated within social institutions such as schools, families, courts, and correctional facilities, and how their treatment affects social inequality. RESTRICTIONS: This course is open to all graduate students in Arts & Sciences. Other students can enroll with permission of instructor.

SOCI 637  **LAW AND SOCIETY IN HISTORICAL PERSPECTIVE**  3
Examination of the social history of law, crime and legal institutions in the United States from colonial times to present. Focus is on the role that law has historically played in allocating resources, structuring social relationships, and distributing political power. May be crosslisted with HIST637.

SOCI 647  **DISPARITIES IN HEALTH & HEALTHCARE**  3
The HRSA define health disparities as population-specific differences in presence of disease, health outcomes, or access to health care, and we will explore these issues as they relate to race, gender, and age.

SOCI 650  **BLACK COMMUNITY STUDIES**  3-6
Investigation and analysis of various topics and developments of interest and significance to the Black community. Crosslisted with BAMS650. RESTRICTIONS: May be repeated up to six credits when topics vary.

SOCI 655  **LAW AND SOCIETY**  3
Historical and structural development of legal systems. Emphasis on comparing legal systems in various cultures from Roman and Oriental law to Anglo-American legal systems.

SOCI 658  **TOPICS IN LAW AND SOCIETY**  3
Examines the relationship between society and law. Reviews the use of cross-disciplinary theory and/or social science research to understand the operation and impact of law and the legal system. Specific topic will vary according to professor's specialization.

SOCI 661  **RACIAL STRATIFICATION**  3
Reviews the concept of race as a social historical category and examines the relationship of racial stratification to other systems of inequality. Also evaluates sociological theories of racial discrimination and institutionalized racism.

SOCI 666  **SPECIAL PROBLEM**  1-12
SOCI 671 DISASTERS, VULNERABILITY & DEVELOPMENT 3
Introduces students to social vulnerability analysis of disasters. Students examine how social, geographical, and cultural factors as well as patterns of development put people differentially at risk to disasters. Emphasizes the intersection of gender, race, class, age, and ability. Disasters in the US are compared and contrasted to international disasters. Students will explore how vulnerable social groups are affected by and cope with hazardous conditions and events, as well as study the capacities of these groups to increase resiliency. Readings draw from disasters studies, feminist studies, and development studies.

SOCI 676 ADVANCED QUALITATIVE METHODS 3
This course explores popular methods of data collection in qualitative research (interviewing, observations, content analysis, etc.), the analysis strategies associated with them, and proper professional/writing-up techniques. PREREQ: Evidence of previous graduate, introductory-level qualitative methods course and/or extensive qualitative work in the field.

SOCI 698 TEACHING IN THE SOCIAL SCIENCES. 1 PF
Seminar for graduate students in Sociology and Criminology, focusing on issues that arise from the teaching of these disciplines. RESTRICTIONS: Requires approval of instructor.

SOCI 813 CURRENT ISSUES IN SOCIAL THEORY 3
Deals with current controversies in social theory such as the public/private distinction, the development of symbolic interactionism and Neo-Marxism. RESTRICTIONS: Must have completed one graduate-level course.

SOCI 815 MICROTHEORIES IN SOCIOLOGY 3
Advanced graduate seminar focusing on microtheoretical approaches in Sociology-symbolic interactionism, social constructionism, and sociological social psychology. PREREQ: SOCI612. RESTRICTIONS: Graduate students only. Strongly advised for students taking the doctoral exam in Social Theory.

SOCI 835 THEORETICAL CRIMINOLOGY I 3
Examines classical and contemporary theories of crime and crime control by focusing on various explanations for why select types of conduct are categorized and treated as criminal, as well as why people engage in criminal behavior. Specific deviant and criminal activities are described and explained using established theoretical frameworks. Provides a comprehensive background in the disciplinary development of criminology.

SOCI 836 APPLICATION OF CRIMINOLOGICAL THEORY AND EMPIRICAL TESTS 3
Examines issues and strategies involved in the collection and analysis of criminological data. Analyzes major theoretical, empirical, and policy-oriented research related to the design, implementation, and analysis of criminological data. Prepares students for continued study and application of contemporary research in criminology.

SOCI 837 CRIMINOLOGY AND SYSTEMS OF CRIMINAL JUSTICE 3
Focuses on basic policy issues in the administration of the criminal justice system, whose key elements are law enforcement, courts, and corrections. Prepares students for continued study of these organizations.

SOCI 866 SPECIAL PROBLEM 1-12

SOCI 868 RESEARCH 1-6

SOCI 869 MASTER’S THESIS 1-6

SOCI 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.

SOCI 969 DOCTORAL DISSERTATION 1-12 PF

SPAN 102 ELEMENTARY SPANISH II 3
Completion of basic Spanish. PREREQ: SPAN101 or SPAN105

SPAN 105 SPANISH I - ELEMENTARY 4
Introduction to the Spanish language and a development of speaking, listening, reading and writing skills through the use of basic texts. RESTRICTIONS: No Spanish background, two or fewer years of high school Spanish.

SPAN 106 SPANISH II - ELEMENTARY/INTERMEDIATE 4
Completion of basic Spanish. Increasing mastery of the basic skills of speaking, listening, reading and writing. PREREQ: SPAN105 RESTRICTIONS: Two to three years of high school Spanish acceptable in lieu of prerequisite.

SPAN 107 SPANISH III - INTERMEDIATE 4
Review of grammar, continued practice in speaking and writing, and reading texts of higher difficulty. PREREQ: SPAN106 or SPAN111. RESTRICTIONS: Four years of high school Spanish acceptable in lieu of prerequisite. Satisfies College of Arts and Sciences language requirement.

SPAN 111 INTERMEDIATE SPANISH I 3
Review of grammar. Increasing mastery of the basic skills of speaking, listening, and reading. PREREQ: SPAN102 or SPAN106 RESTRICTIONS: Three years of high school Spanish acceptable in lieu of prerequisite.

SPAN 112 INTERMEDIATE SPANISH II 3
Continued practice in speaking and writing, reading texts of average difficulty, grammar review as needed. PREREQ: SPAN111 or SPAN106. RESTRICTIONS: Four years of high school Spanish acceptable in lieu of prerequisite. Satisfies College of Arts and Sciences language requirement.

SPAN 200 SPANISH COMPOSITION AND GRAMMAR 3
First part of a thorough grammar review and intensive practice, targeting structure, essential vocabulary, speaking, listening and extensive writing. PREREQ: SPAN107 or SPAN112.

SPAN 201 SPANISH READING AND COMPOSITION 3
Reading, discussion, and analysis of various genres of Hispanic literature. Several short compositions. Grammar review where appropriate. PREREQ: SPAN200. RESTRICTIONS: Not intended for students who have already taken 300 and 400 level literature courses in Spanish.

SPAN 203 SPANISH FOR HERITAGE SPEAKERS 3
For native and heritage speakers of Spanish with oral proficiency but little or no formal training in the language. Designed to build on the language base students already possess, the course’s primary purpose is to develop reading and writing skills. PREREQ: SPAN107 or more than 4 years in high school, AP credit or exemption exam. RESTRICTIONS: Must be a heritage or native speaker of Spanish. SPAN203 exempts students from taking SPAN200, 205, 300, and 305.

SPAN 205 SPANISH CONVERSATION 3
Practical use of Spanish by means of oral reports and discussions. Emphasis on improvement of basic conversational skills. Grammar review where appropriate, and/or some written work. PREREQ: SPAN107, SPAN112, SPAN200 or SPAN201. RESTRICTIONS: A minimum grade of B is required in SPAN107 or SPAN112. Not intended for native speakers of Spanish. Students may not receive credit for both SPAN205 and SPAN206.

SPAN 206 CULTURE THROUGH CONVERSATION 3
Discussion of topics drawn from contemporary Spanish or Latin American life. For students who wish to broaden their knowledge of Hispanic culture while improving their oral and aural language skills. PREREQ: SPAN107 or SPAN112. RESTRICTIONS: Taught abroad only. Students may not receive credit for both SPAN205 and SPAN206.

SPAN 207 CONTEMPORARY LATIN AMERICA I 3
Introduction to contemporary Latin America, its culture, its people, their way of life and the issues confronting them. RESTRICTIONS: Taught abroad, in both English and Spanish. Not for major credit. Does not satisfy College of Arts and Sciences language requirement. May be repeated for credit when taken on different study abroad programs.

SPAN 208 SPAN: PAST AND PRESENT 3
Introduction to Spanish cultural studies, with a focus on Spain’s development as a political, social, and cultural entity. RESTRICTIONS: Taught abroad in English and Spanish. Not for minor credit. Does not satisfy College of Arts and Sciences language requirement.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<td>SPAN 301</td>
<td>Survey of Spanish Literature</td>
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<td>SPAN 302</td>
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<td>SPAN 420</td>
<td>Topics: Medieval Literature</td>
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<td>SPAN 436</td>
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<td>SPAN 447</td>
<td>Contemporary Hispanic Fiction by Women</td>
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</table>
SPAN 450  TOPICS: MODERN HISPANIC LITERATURE 1898-1936  3  Works of one or more authors or of a special theme, genre, or topic within Hispanic literature from 1898 to 1936. May be repeated three times for credit when topics vary. PREREQ: One 300-level survey of literature course

SPAN 452  ADVANCED BUSINESS SPANISH  3  Refines business knowledge of Spanish business and commercial terminology by helping student realize the importance of cultural awareness in doing business in Hispanic countries or with Hispanics in the United States. PREREQ: SPAN200 and SPAN201. SPAN300 and SPAN352 highly recommended

SPAN 454  INTRODUCTION TO SPANISH CINEMA  3  Study of modern Spanish cultural history through the films of such masters as Bardem, Saura, Bunuel, Almodovar, Berlanga, Miro, Amenabar, Medem, Paris, Fejerman, etc. Relation of these films to Spanish culture, politics, history, and to European film theory and analysis. PREREQ: Any 300-level survey of Spanish literature. SPAN325 is strongly recommended

SPAN 455  SELECTED AUTHORS, WORKS AND THEMES  3-12  Works of one or more outstanding authors or on a special theme. PREREQ: One 300-level Spanish literature course. RESTRICTIONS: May be repeated for credit when topics vary.

SPAN 460  TOPICS: CONTEMPORARY HISPANIC LITERATURE 1936-PRESENT  3  Works of one or more authors or of a special theme, genre, or topic within Hispanic literature from 1936 to the present. May be repeated three times for credit when topics vary. PREREQ: One 300-level survey of literature course

SPAN 462  TOPICS: HISPANIC SHORT FICTION  3  Explores short stories and novellas by major writers of the Hispanic world. Each narrative is analyzed as an individual work of literature and is situated in its literary, historical and critical contexts. May be repeated three times for credit when topics vary. PREREQ: One 300-level survey of literature course

SPAN 464  CONTEMPORARY SPANISH AMERICAN LITERATURE BY WOMEN  3  Explores twentieth-century fiction by women authors from diverse regions of Spanish America. Analyses selected works as individual literary creations and situates each author in her specific socio-cultural, historical and literary contexts. PREREQ: One 300-level survey of literature course

SPAN 466  INDEPENDENT STUDY  1-3  A study of cinematographic representation, with a focus on the techniques and tendencies, used by modern directors, of the history, politics, and culture of LA. PREREQ: SPAN307, or SPAN308, or SPAN325, or SPAN326.

SPAN 472  SUGAR, SALSA & SANTERIA  3  Sugar, Salsa and Santeria: A study of culture through the film, music, and literature of the Hispanic Caribbean. PREREQ: SPAN307, or SPAN308, or SPAN325, or SPAN326.

SPAN 473  FROM AMAZONS TO ZOMBIES  3  "From Amazons to Zombies: The Power of Monsters in Latin American Cultures" studies representations and concepts of the monstrous from the age of discovery to contemporary society. PREREQ: SPAN307 or SPAN308 or SPAN325 or SPAN326.

SPAN 474  HISPANIC CITIES  3  Hispanic Cities: Struggle, Space & Representation. PREREQ: SPAN307 or SPAN308 or SPAN325 or SPAN326.

SPAN 475  TOPICS IN HISPANIC CULTURE AND CIVILIZATION  3  Study of topics in Hispanic culture and civilization, ranging through the geography, history, art and society of Spain and Latin American countries. PREREQ: Any of the following: SPAN307, SPAN308, SPAN325, SPAN326. RESTRICTIONS: May be repeated three times for credit when topics vary.

SPAN 476  MEDIA-SAVVY POPULISM FROM CHE TO CHAVEZ  3  Media-Savvy Populism from Che to Chavez: Discourse and Politics in Contemporary Latin America. PREREQ: SPAN307 or SPAN308 or SPAN325 or SPAN326.

SPAN 477  DRUG CULTURE IN LATIN AMERICA  3  Drug production, trafficking, and consumption has had an enormous impact on Latin American Culture, affecting regional politics, everyday life, art and literature. The course examines the highs and lows built on drug commerce, from the psychedelic experiments of the 1960s to Pablo Escobar’s Colombian cocaine empire in the 1980s, to the wave of today’s Mexican drug trade violence. PREREQ: SPAN307 or SPAN308 or SPAN325 or SPAN326.

SPAN 478  GRAPHIC TRANSGRESSIONS  3  Graphic Transgressions: Breakthrough Movements in Latin American Visual Arts and Culture. PREREQ: SPAN307 or SPAN308 or SPAN325 or SPAN326.

SPAN 479  RESURRECTING MEXICO’S DEAD  3  Death and resurrection have been used as tropes in various media in Mexican culture to discuss social, political, and economic concerns. These recurring tropes hold symbolic power, evincing in festive Dia de los Muertos celebrations as well as in violent drug trafficking wars. PREREQ: SPAN307 or SPAN308 or SPAN325 or SPAN326.

SPAN 490  CAPSTONE SEMINAR IN HISPANIC LITERATURE  3  Intensive seminar conducted in Spanish and devoted to the study of a selected aspect of transatlantic Hispanic literature over time. Synthesize prior literary and cultural studies in Spanish through immersion in an area that integrates and expands student’s existing knowledge. Emphasizes independent research and intensive critical writing. PREREQ: One of SPAN 301, 302, 303, 304, 355 or 370 and one SPAN 400-level course. RESTRICTIONS: This capstone course is designed for Spanish majors in their senior year of study.

SPAN 491  LATIN AMERICAN STUDIES CAPSTONE  3  Through intensive research and study of texts and artifacts on a single theme, students will integrate and focus their knowledge of Latin American cultures across several disciplines. Taught in Spanish. May be crosslisted with LAMS491. PREREQ: SPAN326.

SPAN 601  ADVANCED SPANISH GRAMMAR  3  Study and practice of selected problems of written and oral Spanish syntax and vocabulary as well as textual analysis.

SPAN 603  HISTORY OF THE SPANISH LANGUAGE  3  History of the language from Latin to the present. Historical phonology and morphology.

SPAN 615  LATIN AMERICAN LITERATURE AND ITS POLITICAL CONTEXT  3  In-depth analysis of selected works by contemporary Latin American authors, focusing on techniques used by these writers to reveal the political upheaval that has affected Latin America in recent years.


SPAN 618  GOD, MAN AND WOMAN  3  Analysis of the presentation of God, man and woman in a selection of narrative poems, dramas and novels from the 15th to the 17th centuries. Authors studied include Santillana, Diego de San Pedro, Luis de Leon, Zayas and others.

SPAN 620  TOPICS: MEDIEVAL LITERATURE  3  Works of one or more authors or of a special theme or genre within Spanish medieval literature. Example: Love and Passion in the Middle Ages on the Iberian Peninsula. May be repeated for credit when topics vary.

SPAN 621  SPANISH MEDIEVAL LITERATURE  3  Survey of the major authors and genres of Spanish medieval literature from the early lyric poetry through narrative poetry, short story, drama, novel to the 15th century.

SPAN 636  TOPICS: LITERATURE OF THE SPANISH GOLDEN AGE  3  Works of one or more authors or of a special theme or genre within Spanish literature of the Golden Age (16th and 17th centuries). May be repeated for credit when topics vary.

SPAN 639  POSTWAR SPANISH NARRATIVE  3  Covers the Spanish novel from 1962 to the present. Focuses on novels by leading authors such as Luis Martin-Santos, Juan Goytisolo, Carmen Martin Gaite, and Esther Tusquets. Analysis of these works is grounded in international literary theory and criticism.
SPAN 640  TOPICS: EIGHTEENTH AND NINETEENTH CENTURY HISPANIC LITERATURE  3
Works of one or more authors or of a special theme within Hispanic literature of the 18th and 19th centuries. May be repeated for credit when topics vary.

SPAN 647  CONTEMPORARY HISPANIC FICTION BY WOMEN  3
Explores current fiction by women in Spain and Spanish America. Analyzes selected works as individual literary creations, and also situates them in their cultural, historical and aesthetic contexts, using appropriate critical methodologies.

SPAN 650  TOPICS: MODERN HISPANIC LITERATURE 1898-1936  3
Works of one or more authors or of a special theme, genre, or topic within Hispanic literature from 1898 to 1936. May be repeated for credit when topics vary.

SPAN 655  SELECTED AUTHORS, WORKS AND THEMES  3-12
Works of one or more outstanding authors or on a special theme. May be repeated for credit when topics vary.

SPAN 660  TOPICS: CONTEMPORARY HISPANIC LITERATURE 1936-PRESENT  3
Works of one or more authors or of a special theme, genre, or topic within Hispanic literature from 1936 to the present. May be repeated for credit when topics vary.

SPAN 662  TOPICS: HISPANIC SHORT FICTION  3
Explores short stories and novellas by major writers of the Hispanic world. Each narrative is analyzed as an individual work of literature and is situated in its literary, historical and critical contexts. May be repeated for credit when topics vary.

SPAN 664  CONTEMPORARY SPANISH-AMERICAN LITERATURE BY WOMEN  3
Explores 20th century fiction by major women authors from diverse regions of Spanish America. Analyzes works as individual literary creations, and situates each author in her specific socio-cultural, historical and literary contexts. Examines the international criticism elicited by each work.

SPAN 665  SPANISH READING WORKSHOP  3
Introduction to Hispanic culture through literature, is designed to enhance the cultural proficiency of elementary school teachers through literary readings. Give students the tools required to analyze these readings from different social and educational perspectives, and to adapt them to their elementary school classes.

SPAN 668  HISPANIC CHILDREN’S LITERATURE  3
Introduction to the literature produced specifically for children in Spain, Latin America and the United States. Participants will analyze a series of literary works from theater, to fables and short stories, and develop strategies for integrating them into their elementary school curriculum.

SPAN 672  SUGAR, SALSA & SANTERIA  3
Sugar, Salsa and Santeria: A study of culture through the film, music, and literature of the Hispanic Caribbean.
PREREQ: SPAN307, or SPAN308, or SPAN325, or SPAN326.

SPAN 675  TOPICS: HISPANIC CULTURE AND CIVILIZATION  3
Study of topics in Hispanic culture and civilization, ranging through the geography, history, art and society of Spain and Latin American countries. May be repeated for credit when topics vary.
PREREQ: Either SPAN325 or SPAN326

SPAN 869  MASTER’S THESIS  1-6

SPAN 875  SEMINAR: TOPICS IN SPANISH LITERATURE  3
Study of selected topics, authors and works in the various fields of Spanish literature. Variable content. Emphasizes preparation of seminar presentations and term papers. May be repeated for credit when topics vary.

SPORT MANAGEMENT

SPTM 210  FOUNDATIONS OF SPORT MANAGEMENT  3
Overview of sport management field and segments of sport industry, including types of employment opportunities, as well as skills, educational background, and experiences essential for successful career in sport industry.

SPTM 311  PRACTICUM IN SPORT MANAGEMENT  1 PF
A pre-internship professional experience in a sport management/recreation agency. Students work under the auspices of a faculty supervisor and professional mentor to gain practical experience.
RESTRICTIONS: Open to sport management majors only.

SPTM 313  MANAGEMENT OF SPORT INFORMATION  3
An analysis of the information management process in the sport industry. The relationships between sport organizations, the public and the media are explored.
RESTRICTIONS: Open to sport management majors only.

SPTM 314  FINANCIAL ASPECTS OF SPORT MANAGEMENT  3
Analysis of economic and societal variables impacting the financial viability of professional, intercollegiate and Olympic sport organizations.
RESTRICTIONS: Open to junior/senior sport management majors only.

SPTM 315  LEGAL ASPECTS OF SPORT MANAGEMENT  3
An introduction to the legal system and liability issues of tort law, agency law, antitrust labor law and constitutional law as they apply to professional and amateur sports.
RESTRICTIONS: Open to junior/senior sport management majors, health behavior science majors with a concentration in leisure service management, and legal studies minors.

SPTM 320  MANAGING COLLEGE SPORTS  3
Analyze administrative and management aspects of intercollegiate athletics programs in all three NCAA divisions, with emphasis on Division I program issues.
RESTRICTIONS: At least Jr Status.

SPTM 416  INTERNATIONAL SPORT MANAGEMENT  3
Overview of the international sport environment and structure. Topics include the bid and host process for international sport competitions; the organization of the international sport community; sport development, the penetration strategies of American sport leagues and products into international markets; and the structure of sport in other countries.
RESTRICTIONS: Open to junior and senior sport management majors.

SPTM 417  SPORT MARKETING  3
A study of basic marketing concepts with applications to sport organizations, both amateur and professional. Topics include promotions and public relations, sport consumer behavior, strategic market planning, marketing information management, marketing communications and sponsorship.
RESTRICTIONS: Open to junior and senior sport management majors.

SPTM 418  SPORT EVENT AND FACILITY MANAGEMENT  3
Management of sport events and facilities, including sponsorship acquisition, marketing and promotions, volunteer management, budgeting, participant registration, facility design, and event and facility operations.
RESTRICTIONS: Open only to junior/senior sport management majors.

SPTM 419  ETHICS AND ISSUES IN SPORT MANAGEMENT  3
Examination of the importance of sport in society as a transmitter of values, including major ethical theories in sport and ethical perspectives on current issues in sport.
RESTRICTIONS: Open to senior sport management majors.

SPTM 464  SPORT MANAGEMENT CAPSTONE INTERNSHIP  9
Practical learning experience in Sport Management. Reflect on the theoretical aspects of the industry by analyzing real world issues and identifying professional ethical obligations. Faculty feedback is intended to enhance students’ skills and competencies in a targeted career orientation.
RESTRICTIONS: Requires permission of instructor.

SPTM 616  SPORT MARKETING  3
Marketing applications for amateur and professional sport organizations and the use of sport in the marketing of traditional products and services. Topics include the marketing mix, sport consumer behavior, strategic market planning, branding, and sponsorship.

SPTM 620  INTERNATIONAL SPORT MANAGEMENT AND MARKETING  3
Overview of the global sport industry, including the bid and host process for international sport competitions, the organization of the international sport community, the penetration strategies of American sport leagues and products into international markets, and the structure of sport in other countries.
SPTM 634  SPORT BUSINESS AND FINANCE  3
Principles of financial management and microeconomics as applied to the sport industry, with a focus on spectator sports at both professional and collegiate levels. Topics include the financing of sport facility construction, budgeting in collegiate athletics, and the financial effects of collective bargaining agreements.

SPTM 647  LEGAL ASPECTS OF SPORT MANAGEMENT  3
Overview of the legal principles relevant to sport managers, including tort law, contract law, constitutional law, agency law, risk management, judicial review and administrative law related to the operations and administration of sport and athletic programs.

STATISTICS

STAT 200  BASIC STATISTICAL PRACTICE  3
Uses real data from a variety of disciplines to explore topics in data analysis, estimation and inference such as graphical displays, estimation of and hypothesis tests on means and proportions, sampling distributions, confidence intervals, analysis of variance, simple linear regression, chi-square tests for independence. RESTRICTIONS: Credit may be awarded for only one of STAT200, APEC408, MATH201, and MATH205.

STAT 266  SPECIAL PROBLEM  1-3

STAT 366  INDEPENDENT STUDY  1-6

STAT 408  STATISTICAL RESEARCH METHODS  3
An introductory statistics course for advanced undergraduate and graduate students with applications for life sciences, business, health, engineering, and the social sciences. The course managing and describing data; the normal, t, F and chi-squared distributions; the logic of inference; inferential statistics for one and two sample problems; analysis of table data; analysis of variance; and multiple regression. The course is taught using statistical software. May be crosslisted with APEC408.

STAT 409  REGRESSION AND EXPERIMENTAL DESIGN  3
Introduction and overview of inferential methods used in analyzing regression models and linear models for experimental designs. PREREQ: STAT200 or APEC408 or equivalent

STAT 418  SAMPLING METHODS  3
Types of sampling, census vs. survey, methods of sample selection, sampling and non-sampling errors. Planning and execution of surveys, and data collection in selected fields of application. PREREQ: STAT371

STAT 420  DATA ANALYSIS AND NONPARAMETRIC STATISTICS  3
Techniques of exploratory and graphical data analysis for univariate and multivariate data sets, and numerical and categorical variables. Emphasis on selection of proper procedure. Non-parametric techniques of estimation testing and curve smoothing. PREREQ: STAT371

STAT 46!  INDEPENDENT STUDY  1-6

STAT 470  INTRO TO STAT ANALYSIS I  3
Basic probability, De Morgan’s laws, conditional probabilities, Bayes' rule; discrete and continuous distributions; Bernoulli, Binomial, Poisson, Normal, Gamma and Cauchy distributions; transformations; joint and marginal distributions; moment generating functions; sums of independent normal and Gamma random variables; Chi-squared distributions; the Central Limit Theorem. PREREQ: MATH222 or MATH242.

STAT 471  INTRO TO STAT ANALYSIS II  3
Definition of a statistic; distribution of common statistics; sampling, maximum likelihood and moment estimators, unbiased estimators; hypothesis testing, Type I and Type II errors, one- and two-sample tests for the mean; categorical data, the Chi-Squared test; simple linear regression, ANOVA table. PREREQ: MATH222 or MATH242.

STAT 474  APPLIED DATA BASE MANAGEMENT  3
Provides an in-depth understanding of using computers to manage data using programs such as SAS and Microsoft Access.

STAT 475  ENVIRONMENTAL STATISTICS  3
Introduction to statistical methods for analyzing environmental data. Relevant probability and sampling theory is introduced, as well as procedures for summarizing, modeling and estimating and making inferences from environmental data. A computer-based statistical package is used to explore behavior of different statistical techniques with a variety of environmental data sets. May be crosslisted with ENSC475. RESTRICTIONS: If STAT475 is taken, degree credit cannot be given for any of the following courses: MATH300, STAT470, STAT471 or MATH450.

STAT 601  PROBABILITY THEORY FOR OPERATIONS RESEARCH AND STATISTICS  3
Provides the basic background in probability theory for further work in statistics and operations research. Basic topics: sample spaces and axioms of probability; conditional probability and independence; Bayes theorem; random variables; moments and moment generating functions; transformations of random variables; common families of distributions; multivariate distributions, covariance and correlation; probability inequalities and limit theorems. PREREQ: MATH243 and requires permission of instructor.

STAT 602  MATHEMATICAL STATISTICS  3
Derived sampling distributions; decision theory; estimation theory; multivariate normal; hypotheses testing; special topics. PREREQ: STAT601

STAT 603  VECTOR SPACES AND OPTIMIZATION  3
Bases, linear transformations, subspaces, projection theorem, least squares, eigenvalues, eigenvectors, matrix factorizations. Quadratic programming, convexity, duality, Karash-Kuhn-Tucker conditions, constraints, sequential quadratic programming. Linear programming, simplex method, interior point methods. Examples taken from maximum likelihood estimation, robust and ridge regression, resource allocation, transportation problems. PREREQ: MATH243 and MATH349

STAT 608  STATISTICAL RESEARCH METHODS  3
An introductory statistics course for advanced undergraduate and graduate students with applications for life sciences, business, health, engineering, and the social sciences. The course managing and describing data; the normal, t, F and chi-squared distributions; the logic of inference; inferential statistics for one and two sample problems; analysis of table data; analysis of variance; and multiple regression. The course is taught using statistical software.

STAT 609  REGRESSION AND EXPERIMENTAL DESIGN  3
Introduction and overview of inferential methods used in analyzing regression models and linear models for experimental designs. PREREQ: STAT608 or equivalent

STAT 611  REGRESSION ANALYSIS  3
Simple linear and nonlinear regression. Subset regression; principal component and ridge regression. Introduction to experimental design and design models. PREREQ: MATH202 or STAT371

STAT 612  ADVANCED REGRESSION TECHNIQUES  3
Selected topics in advanced regression analysis. RESTRICTIONS: Requires permission of instructor.

STAT 613  APPLIED MULTIVARIATE STATISTICS  3
Explores the main topics of multivariate statistics, including principal components, discrimination, classification procedures, and clustering techniques. Emphasis on how to identify the correct technique for a given problem, computer packages for its computation, and how to interpret the results.

STAT 615  DESIGN AND ANALYSIS OF EXPERIMENTS  3
Fundamental principles of design, randomized designs, Latin squares, sources of error, components of error. Factorial designs, response surfaces, models for design. PREREQ: STAT371

STAT 616  ADVANCED DESIGN OF EXPERIMENTS  3
Planning of experiments, designs for specific problems, fractional factorials, quasi-factorial experiments, balanced and unbalanced designs, confounding, introduction to linear estimation. PREREQ: STAT615

STAT 617  MULTIVARIATE METHODS  3
Multivariate analysis of variance and covariance; classification and discrimination; canonical correlation; principal components; factor analysis. PREREQ: STAT602 and permission of instructor.

STAT 618  SAMPLING TECHNIQUES  3
Simple random sampling; stratified random sampling; ratio estimates; regression estimates; systematic sampling; cluster sampling; double sampling. PREREQ: STAT371
<table>
<thead>
<tr>
<th>STAT 619</th>
<th>TIME SERIES ANALYSIS</th>
<th>3</th>
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<tbody>
<tr>
<td>Fundamental topics in time series analysis - features the Box and Jenkins techniques of fitting time series data. Includes an introduction to appropriate statistical packages.</td>
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<td>RESTRICTIONS: Requires permission of instructor.</td>
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<thead>
<tr>
<th>STAT 620</th>
<th>NONPARAMETRIC STATISTICS</th>
<th>3</th>
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<tbody>
<tr>
<td>Statistical procedures valid under unrestricted assumptions; scales of measurement; efficiency comparisons; signed rank procedures; two-sample rank tests; zeros, ties, and other problems of discrete data; order statistics; k-sample procedures; nonparametric measures of correlation.</td>
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<td>PREREQ: STAT 601</td>
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<thead>
<tr>
<th>STAT 621</th>
<th>SURVIVAL ANALYSIS</th>
<th>3</th>
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<tbody>
<tr>
<td>Statistical techniques used in the analysis of censored data including the Kaplan-Meier estimator, the analysis of one, two and K sample problems, and regression analysis based on the Cox proportional hazards model.</td>
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<td>RESTRICTIONS: Requires permission of instructor.</td>
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<thead>
<tr>
<th>STAT 624</th>
<th>ADVANCED TOPICS IN STATISTICS</th>
<th>3</th>
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<tbody>
<tr>
<td>Current statistical and research techniques not covered in other courses.</td>
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<td>RESTRICTIONS: Requires permission of instructor.</td>
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<thead>
<tr>
<th>STAT 635</th>
<th>STATISTICAL QUALITY CONTROL</th>
<th>3</th>
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<tbody>
<tr>
<td>Process variation, sequence plotting, control charts, cumulative sum process control procedures; process capability studies, acceptance sampling, quality management and organization, and trouble shooting using graphical techniques.</td>
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<td>PREREQ: STAT 371</td>
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<thead>
<tr>
<th>STAT 640</th>
<th>STATISTICAL CONSULTING</th>
<th>3</th>
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<tbody>
<tr>
<td>Topics include the client/consultant relationship; effective communication; identifying the question, developing a plan and presenting the results; following up; actual consulting experience.</td>
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<thead>
<tr>
<th>STAT 641</th>
<th>STATISTICAL LABORATORY</th>
<th>1</th>
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</thead>
<tbody>
<tr>
<td>Requires attendance at the weekly statistical laboratory meetings.</td>
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<tr>
<th>STAT 656</th>
<th>BIOSTATISTICS</th>
<th>3</th>
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<tbody>
<tr>
<td>Research designs, review of inference and regression, categorical data, logistic regression, rates and proportions, sample size determination. Additional topics such as nonparametric methods, survival analysis, longitudinal data analysis, and randomized clinical trials may be covered.</td>
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<td>PREREQ: STAT 608 or STAT 611</td>
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<thead>
<tr>
<th>STAT 657</th>
<th>STATISTICS FOR EARTH SCIENCES</th>
<th>3</th>
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<tbody>
<tr>
<td>Multiple regression and time series analysis; model validation; sampling; principal components; factor analysis; cluster analysis; discriminant analysis; and statistical software routines. May be crosslisted with GEOG 660 or GEOL 640.</td>
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<tr>
<td>PREREQ: MATH 201 or STAT 475 or STAT 200. RESTRICTIONS: Cannot be taken for credit in the Statistics Master's degree program.</td>
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<thead>
<tr>
<th>STAT 659</th>
<th>SPATIAL STATISTICS</th>
<th>3</th>
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<tbody>
<tr>
<td>Some research applications require inferences to be drawn from point, line, or areal data, rather than from the traditional univariate or multivariate framework. A number of such techniques have been developed including adaptations from classical statistical methods and novel approaches to account for the spatial nature of data. Explore the emerging literature on statistical methodologies that have been explicitly developed for the solution of spatial problems. May be crosslisted with GEOG 662 or GEOL 659.</td>
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<tr>
<td>PREREQ: MATH 201 or STAT 475 or STAT 200. RESTRICTIONS: Cannot be taken for credit in the Statistics Master's Degree program.</td>
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<thead>
<tr>
<th>STAT 664</th>
<th>STATISTICS INTERNSHIP</th>
<th>1-6 PF</th>
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<tbody>
<tr>
<td>Supervised on the job experience, performing statistical analysis of problems for clients.</td>
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<td>RESTRICTIONS: Requires permission of instructor.</td>
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<thead>
<tr>
<th>STAT 668</th>
<th>RESEARCH PROJECT</th>
<th>3-6</th>
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<tbody>
<tr>
<td>All students in the M.S. Biostatistics Program must participate in a research project as part of the degree requirements.</td>
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<tr>
<td>RESTRICTIONS: Approval by Biostatistics Advisor.</td>
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<thead>
<tr>
<th>STAT 669</th>
<th>MASTERS THESIS</th>
<th>3-6</th>
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</thead>
<tbody>
<tr>
<td>Thesis credits for work done over several semesters to complete and defend a Masters Thesis.</td>
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<table>
<thead>
<tr>
<th>STAT 670</th>
<th>INTRO TO STAT ANALYSIS I</th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td>Basic probability, De Morgan’s laws, conditional probabilities, Bayes’ rule; discrete and continuous distributions; Bernoulli, Binomial, Poisson, Normal, Gamma and Cauchy distributions; transformations; joint and marginal distributions; moment generating functions; sums of independent normal and Gamma random variables; Chi-squared distributions; the Central Limit Theorem.</td>
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<tr>
<td>PREREQ: MATH 222 or MATH 242.</td>
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<thead>
<tr>
<th>STAT 671</th>
<th>INTRO TO STAT ANALYSIS II</th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td>Definition of a statistic; distribution of common statistics; sampling, maximum likelihood and moment estimators, unbiased estimators; hypothesis testing, Type I and Type II errors, one- and two-sample tests for the mean; categorical data, the Chi-Squared test; simple linear regression, ANOVA table.</td>
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<tr>
<td>PREREQ: MATH 222 or MATH 242.</td>
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<thead>
<tr>
<th>STAT 674</th>
<th>APPLIED DATA BASE MANAGEMENT</th>
<th>3</th>
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<tbody>
<tr>
<td>Provides an in-depth understanding of using computers to manage data using programs such as SAS and Microsoft/Access. May be offered concurrently with STAT 474.</td>
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<td>RESTRICTIONS: Requires permission of instructor.</td>
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<tr>
<th>STAT 675</th>
<th>LOGISTIC REGRESSION</th>
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<tbody>
<tr>
<td>Practical and computational introduction to logistic regression and related topics. Applications include financial, marketing and biomedical research. The use of SAS and other statistical packages will be emphasized.</td>
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<td>RESTRICTIONS: Requires permission of instructor.</td>
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<thead>
<tr>
<th>STAT 800</th>
<th>ESTIMATION AND STATISTICAL INFERENCE I</th>
<th>3</th>
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<tbody>
<tr>
<td>Selected topics in estimation and inference such as uniformly most powerful tests, uniformly most powerful unbiased tests, similarity and completeness, sufficiency, likelihood ratio tests, invariant tests, permutation test.</td>
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<td>PREREQ: STAT 602, MATH 602</td>
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<table>
<thead>
<tr>
<th>STAT 801</th>
<th>ESTIMATION AND STATISTICAL INFERENCE II</th>
<th>3</th>
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<tbody>
<tr>
<td>Further topics in estimation and inference will be covered.</td>
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<tr>
<td>PREREQ: STAT 800</td>
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<thead>
<tr>
<th>STAT 815</th>
<th>LINEAR STATISTICAL INFERENCE I</th>
<th>3</th>
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<tbody>
<tr>
<td>Vector random variables, matrix operations, multivariate normal distributions, distribution of functions of vector random variables, topics from multivariate analysis and specific linear models.</td>
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<td>PREREQ: STAT 602, STAT 615</td>
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<thead>
<tr>
<th>STAT 816</th>
<th>LINEAR STATISTICAL INFERENCE II</th>
<th>3</th>
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<tbody>
<tr>
<td>Topics from general linear hypotheses of full rank and not full rank.</td>
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<tr>
<td>PREREQ: STAT 815</td>
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<tr>
<th>STAT 818</th>
<th>MULTIVARIATE ANALYSIS</th>
<th>3</th>
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<tbody>
<tr>
<td>Likelihood estimation, vector random variables, Hotelling's T-squared distribution of correlation coefficients, classification and discrimination, distribution of sample covariance matrix and generalized variance, and testing multiple hypotheses.</td>
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<tr>
<td>PREREQ: STAT 800</td>
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<tr>
<th>STAT 824</th>
<th>ADVANCED TOPICS IN STATISTICS I</th>
<th>3</th>
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<tbody>
<tr>
<td>A presentation of a current area of statistical application or research. Examples of topics which may be covered include: biometry, bootstrapping, data analysis, response surfaces, survival analysis and time series.</td>
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<tr>
<td>PREREQ: STAT 816</td>
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<tr>
<th>STAT 831</th>
<th>TIME SERIES ANALYSIS</th>
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<tbody>
<tr>
<td>Introduction to fundamental topics in time series analysis featuring analysis in both time and frequency domains. The Box and Jenkins technique of fitting data to autoregressive moving average models will be used in time domain. Emphasis on model building, evaluation and forecasting. Analysis in frequency domain includes such topics as digital filtering and methods of estimating and interpreting the spectrum.</td>
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<tr>
<td>PREREQ: STAT 602</td>
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<thead>
<tr>
<th>STAT 832</th>
<th>TOPICS IN DATA ANALYSIS</th>
<th>3</th>
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<tbody>
<tr>
<td>Topics: graphical analysis; model evaluation, robust procedures; influence functions; multidimensional data plots, residual analysis; Bayesian concepts in data analysis.</td>
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<tr>
<th>STAT 836</th>
<th>RESPONSE SURFACE METHODOLOGY</th>
<th>3</th>
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<tbody>
<tr>
<td>Derivation of nonlinear relationships between variables. Techniques for characterization and interpreting multidimensional systems through canonical and ridge analysis. Correlation analysis through eigenvalues and eigenvectors for linear systems.</td>
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<tr>
<td>PREREQ: STAT 602 and either STAT 611 or STAT 617</td>
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</table>
THEA 102  INTRODUCTION TO PERFORMANCE  3
Survey of performance training techniques for the non-minor. Topics may include elements of voice, improvisation, movement, dance, and character analysis and portrayal.

THEA 104  INTRODUCTION TO THEATRE AND DRAMA  3
Survey of the elements of theatre and drama. Includes attendance at theatrical productions, readings of representative plays, discussion of a method of dramatic analysis, explanation of staging in periods of major importance and discussion of the actor, designer and director.

THEA 106  THE THEATRICAL EXPERIENCE ABROAD  3
Survey of the elements of performance, theatre and drama in relationship to observed field performances. Attendance at rigorous program of theatrical performances. Studies elements of voice, improvisation, movement, dance, character analysis and portrayal specifically based on observed performances.

THEA 200  INTRODUCTION TO THEATRE PRODUCTION  3
Processes involved in the production of scenery, properties, lighting, sound and costumes for live performance events. Plays read and analyzed for production requirements.

THEA 202  INTRODUCTION TO THEATRE DESIGN  3
Survey of the evolution of design theory and aesthetics for live production. Elements include the design of scenery, properties, costumes, lighting and sound. Plays read and analyzed for design requirements.

THEA 203  INTRODUCTION TO COSTUMING  3
Explores the evolution of costume design and technology. Discusses and analyzes all aspects of costuming through reading of plays.

THEA 204  INTRODUCTION TO VOICE AND SPEECH  3
The use of voice and speech in performance. Includes exercises to develop relaxation, breath support, resonance, vocal strength, optimum pitch and articulatory precision, as well as studies in basic vocal anatomy. Studio format.

THEA 205  INTRODUCTION TO STAGE MOVEMENT  3
Introduction to a variety of physical skills and techniques for the actor. Topics may include exercises to develop strength, flexibility, control, awareness, rhythm, balance, and expressiveness.

THEA 207  TECHNICAL PRODUCTION PRACTICUM  1-4
Laboratory for the non-minor for the production of scenery, properties, lighting, and sound for public performances of the Professional Theatre Training Program productions.

THEA 209  COSTUME PRODUCTION PRACTICUM  1-4
Laboratory for the non-minor for the production of costumes and costume crafts for public performances of the Professional Theatre Training Program productions.

THEA 212  JEWS AND AMERICAN POP CULTURE  3
As the Jewish population of America grew rapidly during the early decades of the 20th century, Jews brought with them a rich and diverse tapestry of dramatic and theatrical modes. This course will examine the development of this extraordinary creative and commercial phenomenon. May be crosslisted with JWS212.
THEA 308 FUNDAMENTALS OF COSTUME CRAFTS 3
Provides basic experience in several crafts-related areas commonly utilized in costume making, including mask making, surface design, hat making, leather work and thermoplastics.

THEA 309 FUNDAMENTALS OF STAGE MANAGEMENT 3
Study of the techniques and procedures used in managing theatrical productions from concept through performance.

THEA 310 FUNDAMENTALS OF MASKMAKING 3
Includes casting, sculpting human and animal features, and explores various methods and materials for constructing theatrical masks. Students construct three to four masks.

THEA 311 FUNDAMENTALS OF SCENE DESIGN 3
Introduction to the exploration of conceptual principles underlying the practice of scene design. Explore elements of visual thinking through the manipulation of drafting and drawing with emphasis on line, form, color, and spatial relationships as they relate to the play. Some artistic ability is helpful.

THEA 312 CAD AND COMPUTER APPLICATIONS FOR THEATRE PRODUCTION 3
Examines various ways of applying computer technology to the production of live theatre. Emphasis placed on CAD and graphic software in addition to Power Point, spreadsheets, databases, and the internet.
PREREQ: THEA200, or THEA202, or by permission of instructor.

THEA 340 AFRICAN AMERICAN THEATRE 3
Introduction to African American Theatre and the impact of African Americans in theatre performance. Critical discussions of plays and historical events, and allows students to uncover how non-traditional casting affects the playing and development of a theatrical performance. Explore the similarities and differences of theatrical styles and tactics as they pertain to African American theatre and performance.

THEA 341 THEATRE/DRAMA: CLASSIC/MEDIEVAL 3
Survey of major historical and theoretical developments in theatre practice and dramaturgy during the period. Readings in primary and secondary historical sources, major critical and theoretical texts, and representative plays of the period. May be crosslisted with CMLT341.

THEA 342 THEATRE/DRAMA: RENAISSANCE TO 1700 3
Survey of major historical and theoretical developments in theatre practice and dramaturgy during the period. Readings in primary and secondary historical sources, major critical and theoretical texts, and representative plays of the period. May be crosslisted with CMLT342.

THEA 343 THEATRE/DRAMA: 1700 TO 1900 3
Survey of major historical and theoretical developments in theatre practice and dramaturgy during the period. Readings in primary and secondary historical sources, major critical and theoretical texts, and representative plays of the period. May be crosslisted with CMLT343.

THEA 344 THEATRE/DRAMA: 1900 TO PRESENT 3
Survey of major historical and theoretical developments in theatre practice and dramaturgy during the period. Readings in primary and secondary historical sources, major critical and theoretical texts, and representative plays of the period. May be crosslisted with CMLT344.

THEA 345 HISTORY OF THEATRE: AMERICAN MUSICAL THEATRE 3
Musical-dramatic forms of the 18th, 19th and 20th centuries in the United States and their impact on the modern musical theatre. Complete works read and compared to a series of criteria that are found in successful modern shows. Comparison of older and current works. Crosslisted with MUSC345. RESTRICTIONS: Offered fall semester only.

THEA 347 SPECIAL TOPICS IN THEATRE HISTORY 3
A series of changing topics in history and theory. Topics range from studies of significant movements in theatre to the study of theoretical issues and individual playwrights and genres.

THEA 348 SPECIAL TOPICS IN THEATRE PERFORMANCE 3
Series of changing topics in theatre performance. Topics may include Audition Preparation and Introduction to Professional Theatre Practices.

THEA 360 FUNDAMENTALS OF ORAL INTERPRETATION 3
Basic course in interpretation of text for the stage. Concentrates on texts from plays; explores prose and poetry. Emphasis on diction, meaning and presentation. Studio format.

THEA 361 ACTING TECH FOR BUSINESS PROFESSIONALS 3
Opportunity to increase effectiveness in presentation situations. Introduction to a variety of acting techniques, including body and vocal use, dramatic structure and having an awareness of, and listening and responding to, the audience.

THEA 366 INDEPENDENT STUDY 1-6

THEA 408 THEATRE PRACTICUM FOR MINORS 1-4
Production responsibilities assigned on departmental productions in the areas of lighting, sound, scenery, properties, costuming, stage management, painting, and theatre management.

THEA 410 FUNDAMENTALS OF DRAMATURGY 3
Topics covered include various methods of dramatic and entertainment analysis, scene analysis, development of dramaturgical plot, fable and practice. Survey of function and role of the dramaturgy in contemporary theatre. Readings in primary and secondary material.

THEA 420 FUNDAMENTALS OF STAGE DIRECTING 3
Exploration of the director’s part in the creative process of theatre. Philosophy, techniques and problems of directing plays.

THEA 466 INDEPENDENT STUDY 1-6

THEA 490 SEMINAR IN THEATRE AND DRAMA 3
Seminar in theatre and drama. Topics will be announced.
RESTRICTIONS: Requires permission of instructor.

THEA 600 DISTINCTIONS OF PROFESSIONAL THEATRE PRACTICE 1-3
Inquiry into the nature of the theatre as an art form; techniques and issues of communication, organization, management, leadership team participation and creativity necessary to the pursuit and accomplishment of fulfilling careers in institutional and commercial theatres. Explores how the nature and purpose of the theatre as an art informs the day-to-day practices, values and behavior of the individual artist.
RESTRICTIONS: Requires enrollment in Professional Theatre Training Program. May be repeated up to 12 credit hours.

THEA 601 DYNAMICS 1
A vocal/physical warmup. Exercises designed to prepare student for the day’s work.
RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program. May be repeated up to six credit hours.

THEA 602 VOICE DEVELOPMENT IA 1
Basic breath control and tone production to develop strength, control, flexibility and awareness.
RESTRICTIONS: Requires enrollment in the Professional Theatre Program/Acting or Directing.

THEA 603 VOICE DEVELOPMENT IB 1
Continuation of THEA602.
PREREQ: THEA602

THEA 604 VOICE DEVELOPMENT IIA 1
Continuation of THEA603, with an emphasis on range extension and the development of greater variety in expressiveness.
PREREQ: THEA603

THEA 605 VOICE DEVELOPMENT IIB 1
Continuation of THEA604.
PREREQ: THEA604

THEA 606 VOICE DEVELOPMENT IIC 1
Individual instruction to identify habitual vocal patterns and to strengthen individual weaknesses in voice.
PREREQ: THEA605

THEA 607 VOICE DEVELOPMENT IIB 1
Continuation of THEA606.
PREREQ: THEA606
THEA 608  STAGE MOVEMENT IA  1
Exercises and assignments to develop alignment, strength, flexibility, control, awareness, endurance, rhythmic sensitivity, balance and expressiveness.
RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Acting or Directing.

THEA 609  STAGE MOVEMENT IB  1
Continuation of THEA608. PREREQ: THEA608

THEA 610  STAGE MOVEMENT IIA  1
Continuation of THEA609, with an emphasis on stage combat, tumbling, circus and other advanced movement techniques. PREREQ: THEA609

THEA 611  STAGE MOVEMENT IIB  1
Continuation of THEA610. PREREQ: THEA610

THEA 612  STAGE MOVEMENT IIIA  1
Individual instruction to identify habitual movement patterns and to strengthen individual weaknesses in stage movement. PREREQ: THEA611

THEA 613  STAGE MOVEMENT IIIB  1
Continuation of THEA612. PREREQ: THEA612

THEA 614  STAGE SPEECH IA  2
Ear training and phonetics. Corrective work on regional speech habits. RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Acting or Directing.

THEA 615  STAGE SPEECH IB  2
Continuation of THEA614. Beginning work on verse scansion. PREREQ: THEA614

THEA 616  STAGE SPEECH IIA  1
Continuation of THEA615 with an emphasis on phrasing and verse scansion. PREREQ: THEA615

THEA 617  STAGE SPEECH IIB  1
Continuation of THEA616. PREREQ: THEA616.

THEA 618  STAGE SPEECH IIIA  1
Stage dialects and advanced work in phrasing and verse scansion. Individual tutoring in problem areas. PREREQ: THEA617

THEA 619  STAGE SPEECH IIIB  1
PREREQ: THEA618

THEA 620  REHEARSAL AND PERFORMANCE/ACTING  1-6
Practical instruction and assignments in the preparation, rehearsal and performance of theatrical productions. RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Acting. May be repeated up to 24 credit hours.

THEA 621  VERSE SPEAKING, RHETORIC, AND COMMUNICATION IA  1
Consists of exercises and assignments to develop power, freedom, beauty, clarity, presence, and self-expression in communication in classic plays, particularly those of William Shakespeare, as well as in prose writing of all periods. Particular emphasis placed on cultivating ability to recognize and embody the changing structures and rhythms of speech which have been codified in the scripts of plays. Requires enrollment in the Professional Theatre Training Program/Acting.

THEA 622  VERSE SPEAKING, RHETORIC, AND COMMUNICATION IB  1
Consists of exercises and assignments to develop power, freedom, beauty, clarity, presence, and self-expression in communication in classic plays, particularly those of William Shakespeare, as well as in prose writing of all periods. Particular emphasis placed on cultivating ability to recognize and embody the changing structures and rhythms of speech which have been codified in the scripts of plays. PREREQ: THEA621.

THEA 623  VERSE SPEAKING, RHETORIC, AND COMMUNICATION IIA  1
Consists of exercises and assignments to develop power, freedom, beauty, clarity, presence, and self-expression in communication in classic plays, particularly those of William Shakespeare, as well as in prose writing of all periods. Particular emphasis placed on cultivating ability to recognize and embody the changing structures and rhythms of speech which have been codified in the scripts of plays. PREREQ: THEA622.

THEA 624  VERSE SPEAKING, RHETORIC, AND COMMUNICATION IIB  1
Consists of exercises and assignments to develop power, freedom, beauty, clarity, presence, and self-expression in communication in classic plays, particularly those of William Shakespeare, as well as in prose writing of all periods. Particular emphasis placed on cultivating ability to recognize and embody the changing structures and rhythms of speech which have been codified in the scripts of plays. PREREQ: THEA623.

THEA 633  STAGE MANAGEMENT ORGANIZATIONAL AND MANAGERIAL TECHNIQUES IA  1-2
Development of organizational and communication techniques for the administration of stage managerial projects. RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Stage Management.

THEA 634  STAGE MANAGEMENT ORGANIZATIONAL AND MANAGERIAL TECHNIQUES IIB  1-2
Further development of organizational and communication techniques for the administration of stage managerial projects. PREREQ: THEA633

THEA 635  STAGE MANAGEMENT ORGANIZATIONAL AND MANAGERIAL TECHNIQUES IIA  1-2
Development of organizational and communication techniques for the administration of stage managerial projects. PREREQ: THEA634

THEA 636  STAGE MANAGEMENT ORGANIZATIONAL AND MANAGERIAL TECHNIQUES IIB  1-2
Further development of organizational and communication techniques for the administration of stage managerial projects. PREREQ: THEA635

THEA 638  STAGE MANAGEMENT ORGANIZATIONAL AND MANAGERIAL TECHNIQUES IIIB  1-2
Further development of organizational and communication techniques for the administration of stage managerial projects. PREREQ: THEA637

THEA 639  STAGE MANAGEMENT PRODUCTION SKILLS IA  1-2
Development of stage managerial skills for organizing, preparing and fulfilling theatrical productions from inception through rehearsals and performance. RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Stage Management.

THEA 640  STAGE MANAGEMENT PRODUCTION SKILLS IIB  1-2
Further development of stage managerial skills for organizing, preparing and fulfilling theatrical productions from inception through rehearsals and performance. PREREQ: THEA639

THEA 641  STAGE MANAGEMENT PRODUCTION SKILLS IIIB  1-2
Development of stage managerial skills for organizing, preparing and fulfilling theatrical productions from inception through rehearsals and performance. PREREQ: THEA640

THEA 642  STAGE MANAGEMENT PRODUCTION SKILLS IIIC  1-2
Further development of stage managerial skills for organizing, preparing and fulfilling theatrical productions from inception through rehearsals and performance. PREREQ: THEA641

THEA 644  STAGE MANAGEMENT PRODUCTION SKILLS IIID  1-2
Further development of stage managerial skills for organizing, preparing and fulfilling theatrical productions from inception through rehearsals and performance. PREREQ: THEA643

THEA 645  REHEARSAL AND PERFORMANCE/STAGE MANAGEMENT  1-5
Practical instruction and assignments in the preparation, rehearsal and performance of theatrical productions. RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Stage Management. May be repeated up to 24 credit hours.

THEA 648  COSTUME CONSTRUCTION  1
Introductory exploration of the mechanics and technology of the art of costuming. Surveys all aspects of the costumer's craft including practical work in the costume shop. RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Costume Construction.

THEA 664  INTERNSHIP IN PROFESSIONAL THEATRE  1-9
Engagement with professional theatre in individual discipline area. RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program. May be repeated up to 18 credit hours.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>THEA 665</td>
<td>THEATRE LITERACY</td>
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<td>Discussion, research, and practicum in theatre terminology, literature and history.</td>
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<td>RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program. May be repeated up to 12 credit hours.</td>
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<tr>
<td>THEA 668</td>
<td>RESEARCH</td>
<td>1-6</td>
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<tr>
<td>THEA 674</td>
<td>SCENERY PRODUCTION</td>
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<tr>
<td></td>
<td>Materials, tools, hardware and construction methods used for scenery construction. Emphasis on traditional scenic construction with wood as the primary material.</td>
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<td>RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Technical Production.</td>
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<tr>
<td>THEA 675</td>
<td>PROPERTIES PRODUCTION</td>
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<td></td>
<td>Concentrates on property production techniques with emphasis on materials, management, acquisition, and health and safety.</td>
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<td>RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Technical Production.</td>
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<tr>
<td>THEA 676</td>
<td>SCENERY: METALWORKING</td>
<td>1</td>
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<td>Materials, tools and methods of working with metal for scenery construction.</td>
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<tr>
<td>THEA 677</td>
<td>PROPERTIES PRODUCTION II</td>
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<tr>
<td></td>
<td>Tools, materials and methods for upholstery and drapery, casting, mold-making, and other properties techniques.</td>
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<td>PREREQ: THEA674</td>
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<tr>
<td>THEA 680</td>
<td>LIGHTING PRODUCTION</td>
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<td>Electrical theory and practice as applied to theatre production. Emphasis on current lighting production practice, systems and equipment.</td>
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<tr>
<td>THEA 681</td>
<td>AUDIO PRODUCTION</td>
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<td>Sound theory and practice as applied to contemporary theatre production. Emphasis placed on utilizing current systems, equipment and technology for audio production.</td>
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<td>RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Technical Production.</td>
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<tr>
<td>THEA 682</td>
<td>LIGHTING DESIGN</td>
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<td>Essential skills and procedures for creating, documenting and realizing a lighting design for a theatrical production.</td>
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<td>PREREQ: THEA680</td>
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<tr>
<td>THEA 683</td>
<td>PRODUCTION PROJECT MANAGEMENT</td>
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<td>Examines how project management techniques are applied to technical production. Techniques for project analysis, priority setting, scheduling, resource allocation and project tracking will be examined.</td>
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<td>RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Technical Production.</td>
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<tr>
<td>THEA 684</td>
<td>TECHNICAL PRODUCTION SEMINAR</td>
<td>1</td>
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<td>Investigation and discussion of technical problems and issues encountered in productions.</td>
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<td>RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Technical Production. May be repeated up to six credit hours.</td>
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<tr>
<td>THEA 685</td>
<td>STAGE RIGGING, MECHANICS, AND AUTOMATION I</td>
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<td>Theory and practice in rigging stage scenery to fly, creating mechanical systems to actuate scenic units, and utilizing control systems to automate scenic shifting.</td>
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<td>Emphasis on stage rigging systems and proper techniques to utilize them as well as an introduction to fluid power mechanics. Requires enrollment in the professional theatre training program/technical production.</td>
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<tr>
<td>THEA 686</td>
<td>INFORMATION TECHNOLOGIES FOR THEATRE</td>
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<td></td>
<td>Application of computer software to theatrical production practice. Emphasis is placed on CAD (drafting) techniques for theatre production.</td>
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<td>RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Technical Production.</td>
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<tr>
<td>THEA 687</td>
<td>SCENERY PAINTING</td>
<td>1</td>
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<td>Painting tools, materials, color theory and scenery painting techniques for theatrical production.</td>
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<td>RESTRICTIONS: Requires enrollment in Professional Theatre Training Program/Technical Production.</td>
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<tr>
<td>THEA 688</td>
<td>COMPUTER AIDED DRAFTING AND SCENERY CONSTRUCTION</td>
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<td>Continued work on CAD (drafting) with emphasis on construction work drawings for scenery construction. Further study of standard and specialized scenery construction methods.</td>
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<td>PREREQ: THEA686</td>
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<td>THEA 689</td>
<td>STAGE RIGGING, MECHANICS AND AUTOMATION II</td>
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<td>Continuation of THEA685, with added emphasis on horizontal scenic shifting techniques and motion control systems.</td>
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<td>PREREQ: THEA685</td>
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<td>THEA 692</td>
<td>PRODUCTION AND PERFORMANCE/TECHNICAL</td>
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<td>Practical instruction and assignments in the technical preparation and production of Professional Theatre Training Program public performances. Assignments include (but are not limited to): Master Carpenter, Master Electrician, Property Master, Audio Engineer, Scenic Artist and Technical Director.</td>
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<td>RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program/Technical Production. May be repeated up to 20 credit hours.</td>
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<tr>
<td>THEA 693</td>
<td>PRODUCTION SEMINAR</td>
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<td>Development of management and communication techniques for effective interaction among stage management, costume production and technical production areas of theatre.</td>
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<td>RESTRICTIONS: Requires enrollment in the Professional Theatre Training Program. May be repeated up to six credit hours.</td>
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<tr>
<td>THEA 694</td>
<td>SPECIAL TOPICS IN THEATRE PRODUCTION</td>
<td>1-3</td>
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<td>Multiple units on advanced topics in theatre production and management. Students select topics from a list offered by FPTP production faculty.</td>
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<td>RESTRICTIONS: Requires enrollment in the Professional Theater Training Program. May be repeated up to nine credit hours.</td>
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### Urban Affairs and Public Policy

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>UAPP 110</td>
<td>CHANGING THE WORLD AND PUBLIC POLICY</td>
<td>3</td>
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<td></td>
<td>“Going Green”: the haves and have nots, relevant politics - all huge contemporary issues. Can you get a job AND make a difference? Public Policy addresses such issues and begins with you. Examines basic policy concepts/strategies used by citizens, government and other societal institutions.</td>
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<tr>
<td>UAPP 211</td>
<td>INTRODUCTION TO PUBLIC HEALTH</td>
<td>3</td>
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<td>Overview of public health, addressing the history, epidemiological principles, social and behavioral factors, and environmental, political and medical-care issues concerning public health practice. Exploration of the practicality of public health as portrayed through current events, guest speakers, and case studies. Crosslisted with HLPR211.</td>
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<tr>
<td>UAPP 220</td>
<td>CITIZENS, COMMUNITY AND CHANGE</td>
<td>3</td>
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<td>Active citizenship is essential for sustaining democracy. Focuses on exposing students to structures and dynamics of government work to create and implement policies; the reciprocal obligations between individuals and government; and social/political contexts in which policy choices are made and affect community change.</td>
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<tr>
<td>UAPP 222</td>
<td>INTRODUCTION TO EPIDEMIOLOGY</td>
<td>3</td>
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<td>Introduces the basic concepts of epidemiology and biostatistics as applied to public health problems. Emphasis is placed on the principles and methods of epidemiologic investigation, appropriate summaries and displays of data, and the use of classic statistical approaches to describe the health of populations. Crosslisted with HLPR222. COREQ: STAT200 or MATH201 or PSYC209 or BHAN326.</td>
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<td>UAPP 225</td>
<td>CRAFTING PUBLIC POLICY</td>
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<td>Explores how the processes of public policy operate from agenda setting through formulation and legitimation, to implementation and eventual evaluation with examples drawn from several areas of policy (e.g., health, education, environment). Focus primarily on domestic public policy.</td>
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<tr>
<td>UAPP 230</td>
<td>LAW AND PUBLIC POLICY</td>
<td>3</td>
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<td>This course examines how the executive, judicial and legislative branches of the federal government interact to establish, shape and implement public policy. Using court cases, this course will explore the interactions of the three branches in the context of ongoing debates on a range of important policy issues.</td>
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<tr>
<td>UAPP 233</td>
<td>INTRODUCTION TO GLOBAL HEALTH</td>
<td>3</td>
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<td>Introduces key diseases and conditions which affect the health of different populations including basic biological and varying social aspects which cause major global health issues. Emphasis on the developing world, the health of the poor, and possible solutions. Crosslisted with HLPR233.</td>
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<td>UAPP 235</td>
<td>THE FUTURE OF CITIES IN A GLOBAL AGE</td>
<td>3</td>
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<td>This course examines the future of cities in the world and their potential for creating a more sustainable global society. More than half of the world’s population live in cities, and two thirds of the world’s projected nine billion inhabitants will be city-dwellers by 2050.</td>
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</table>
UAPP 268 UNDERGRADUATE RESEARCH 1-3
Undergraduate research conducted on or off campus, out of class, and under the supervision of a UAPP faculty member. Students must keep a log of activities, meet regularly with their faculty sponsor, and submit a final report. One credit requires a minimum of 40 hours of research.

UAPP 300 PUBLIC POLICY FIELD EXPERIENCE 1-9
Policy-oriented, experiential learning. SUAPP faculty, and SUAPP public service and research centers, will provide a mentoring experience in a range of forms including internships, research projects, Study Abroad, and supervised community-based projects on initiatives internal to SUAPP and in the world of practice with public agencies and nonprofit organizations in Delaware, the region, nationally and internationally.
RESTRICTIONS: For public policy majors only. Not intended for freshmen.

UAPP 301 TOPICS IN PUBLIC POLICY 1-3
Special topics in public policy and administration. Topics will vary.
RESTRICTIONS: May be repeated for nine credits when topics vary.

UAPP 325 PUBLIC POLICY ANALYSIS 3
Introduction to the basic principles and concepts of policy analysis. Practice application through problem solving and critical examination of analyses conducted by prominent research groups within the field as well as through case study problem-solving.

UAPP 330 PUBLIC AND NONPROFIT ADMINISTRATION 3
This course examines major topics in public and nonprofit administration, including how policy is transformed into action and services. It also examines key administrative processes and ethical issues facing public and nonprofit leaders.

UAPP 333 RESEARCH METHODS FOR POLICY ANALYSIS 3
Examines research methods and their applications in policy analysis. Demographic analysis, survey research and geographic information systems are applied to policies in such areas as transportation, health, energy and economic development.

UAPP 334 FINANCIAL MANAGEMENT PUBLIC & NONPROFIT 3
This course introduces the practical tools and concepts of financial management for public and nonprofit organizations. Topics include budgeting, capital budgeting, cost analysis, financial planning, investment decisions, debt management, financial reporting, financial statement analysis, and financial condition analysis.

UAPP 337 TOPICS IN POLITICAL COMMUNICATION 1 PF
This lecture series focuses on various thematic issues in political communication and campaign politics.
Crosslisted with COMM337. RESTRICTIONS: May be repeated twice for credit.

UAPP 366 INDEPENDENT STUDY 1-6

UAPP 390 TEACHING ASSISTANT 1-3 PF
Practical teaching experience. Students participate and assist in instruction of an undergraduate UAPP course. Students must work 28 hours for each credit hour.
RESTRICTIONS: Must have a 3.0 GPA, have completed the course for which they assist in good standing, and be available the entire semester.

UAPP 401 PUBLIC POLICY 3
Examines the political economy of public policy, including the intersection of policy with politics and markets, and the institutional and structural dimensions of the policymaking process. The course also explores the challenges of policy implementation, and modes of policy assessment and choice.

UAPP 402 RESEARCH METHODS IN URBAN AND PUBLIC POLICY 3
Explores students to how high quality research in the field of urban and public policy is designed and conducted, and how it can be utilized for making important decisions about the design, implementation and evaluation of projects, programs and policies.

UAPP 405 METROPOLITAN PLANNING AND GOVERNANCE 3
Contemporary issues like sprawl, growth management, and sustainability are inherently wicked, complex, and require the coordinated action of several governmental and non-governmental actors. This course will focus on the roles of government and governance institutions in fostering the cooperation of these actors and the coordination of their activities. This course will also provide you with a history of regional and metropolitan planning.

UAPP 406 PLAN SUSTAINABLE COMMUNITIES & REGIONS 3
Examines theory and methods for planning for more sustainable communities and regions in a global context in the twenty-first century. Sustainable development is defined and theories of sustainable planning presented that meet goals in the areas of environment, economy, and equity (the Three Es). After discussion of issues central to sustainable planning, course looks at tools for sustainable planning and how current land use and regional planning is and can become more oriented to sustainability. The University of Delaware is featured as an example of sustainable planning.

UAPP 407 SEMINAR IN COMMUNITY DEVELOPMENT AND NONPROFIT LEADERSHIP 1
Overview of the philosophical and conceptual foundations of Community Development and the Nonprofit Sector, with a special focus on Leadership approaches that are utilized in both areas. Through a survey of policy topics such as housing, family support and poverty, and social and economic development, examines how each field approaches addressing these issues.

UAPP 408 POVERTY, NEIGHBORHOODS AND COMMUNITY DEVELOPMENT 3
Examines social science literature through which multidisciplinary analysts have described and explained poverty, analyzed neighborhoods, and categorized community development efforts. Focusing on the United States, particular attention is paid to analyses from 1960 to the present.

UAPP 410 POLITICS & THE DELIVERY OF PUBLIC POLICY 3
Focuses on challenges in implementing and delivering policy decisions focusing on key processes including legislative, budget and public information and key players including elected officials, bureaucrats, media, and stakeholders. Students develop skills related to preparing decision memos, press releases and press events in support of a policy implementation plan.

UAPP 411 REGIONAL WATERSHED MANAGEMENT 3
Reviews the practical applications of watershed planning as a tool to manage land, water and ecosystem resources. Explores public policies and practices of watershed planning by examining case studies. Uses a multidisciplinary approach involving the fields of geography, environmental science, geology, public policy, land planning, geographic information systems (GIS) and engineering.

UAPP 412 URBAN HOUSING POLICY AND ADMINISTRATION 3
Examines problems associated with providing adequate and affordable housing in the United States. Covers the structure and dynamics of the housing market; supply and demand factors; market failure; financing methods; federal, state and local public policy affecting housing, including taxation, regulation, subsidy programs, and land use controls.

UAPP 413 PLANNING THEORY AND URBAN POLICY 3
Provides an overview of the development and current conceptual normative and methodological issues in planning theory as applied to urban regions.
PREREQ: UAPP 325 Public Policy Analysis

UAPP 415 MEDIA, CITIZENSHIP & PUBLIC POLICY 3
This course examines the structure, role, influence, and effect that the media have on public policies and the implications for citizenship.

UAPP 418 TRADITIONAL ARCHITECTURAL MATERIALS 3
Overview of composition, fabrication methods, deterioration mechanisms, and preservation needs of stone, ceramic, metal, glass, mortar, plaster, paint, and wood components of traditional architecture from a variety of cultural contexts.

UAPP 419 POLICY LEADERSHIP AND ETHICS 3
Advanced examination of the theory and practice of leadership in public policy, specifically emphasizing ethical issues and implications with and between multiple sectors. May be crosslisted with LEAD419.

UAPP 421 CONTEMPORARY ISSUES IN A GLOBAL SOCIETY 3
Focus on the "cutting edge" issues of urban affairs, public policy and public administration. Features presentations by leading policy makers, policy researchers, practitioners and scholars with whom students engage in lively discussion. Demonstrates the roles that public administration, policy analysis and policy research play in a complex global society. Class participation will be required in both the fall and spring semesters.
**UAPP 423**  **Urban Society and Public Policy**  
Focuses on how individuals and groups contribute to the metropolitan environment and how they react and adapt to their communities. It begins with an examination of city life in early decades of the twentieth century and concludes with a consideration of how globalization is transforming metropolitan communities.

**UAPP 424**  **Comparative Public Policy**  
This course examines public policy and administration in a global context, highlighting the distinctive features of policies in different nations in such areas as health, education, social services, housing, and economic development. The course compares U.S. policies and public institutions with those of other nations.

**UAPP 425**  **Energy Policy and Administration**  
Analyzes energy use and energy policy with respect to politics, society, economics, political economy, technology, resources, and environment. Focuses on interrelationships among energy, environment, economy and equity (E4). It considers the energy policy options needed to achieve a more sustainable world. Crosslisted with ENEP425.

**UAPP 427**  **Evaluating Public Policy**  
Exploration and application of evaluation techniques as they relate to the study of public programs and policies. Explores multiple empirically-based approaches to critical examination of intentions and effects of public policy.

**UAPP 428**  **World Heritage Sites**  
Goals and political context of UNESCO’s World Heritage program, UNESCO activities related to that program, process of nomination of new sites for the World Heritage List, and cultural and preservation issues presented by world heritage sites in a variety of regions and countries.

**UAPP 429**  **Historic Preservation Theory and Practice**  
Analysis of the theory underlying historic preservation in the United States and globally, including its history and evolution over time. Examines the impact of preservation laws and public policies, and the strategies and regulations for identifying significant structures, sites, and cultural heritage worthy of preservation.

**UAPP 430**  **Methods in Historic Preservation**  
Introduces students to the critical skills and methodologies employed in the field of historic preservation. Organization is based on the steps used in preservation planning, including survey and identification of historic resources, evaluation of significance, development of historic context, and creation of preservation treatment alternatives.

**UAPP 431**  **Documentation of Historic Structures**  
Focuses on the process of creating a physical record of a historic structure, including preparation of scaled, annotated field notes and measured drawings in AutoCAD (plans, sections, elevations and details), architectural photography, and learning to “read” the critical features of a historic resource.

**UAPP 433**  **Washington D.C. Policy Practicum**  
Students will live in Washington D.C. and be placed in intern positions. Class will include lectures and site visits and discussions with practitioners and instructors. May be crosslisted with POSC483. RESTRICTIONS: Approval of instructor.

**UAPP 436**  **Research Topics in Historic Preservation**  
Seminar addresses a specific research issue within historic preservation including hypothesis construction, design of research methodology and evaluation of results. Emphasis on use of primary sources and application of data-base techniques.

**UAPP 439**  **Community Development Theory, Concepts and Practice**  
Explores the evolution of core principles and concepts associated with community development, examines various models of practice, and identifies and assesses current challenges and issues confronting the field in the United States.

**UAPP 440**  **Contemporary Policy Issues**  
Capstone course serves as a culminating learning experience for students during their senior year. Involves an integration of the policy skills that they have developed within applied contexts related to their minors or areas of interests and their UAPP 300 Field Experience.

**UAPP 441**  **Topics in Nonprofit Management and Leadership**  
Offers an additional and advanced opportunity to delve into nonprofit management and leadership in the context of the current sociopolitical and economic environment. Expands knowledge and understanding of the issues confronting the sector as a whole and builds analytic and problem-solving skills.

**UAPP 442**  **Strategic Planning for Public and Nonprofit Organizations**  
Provides an introduction to the process of strategic planning and attempts to build the skills and knowledge required for carrying out strategic planning in private nonprofit and public agencies. Focuses on the organizational environments in which planning takes place, examines the theories which underlie planning in general and strategic planning in particular and presents a usable model for strategic planning.

**UAPP 448**  **Environmental Ethics**  
Ethical problems associated with environmental protection, local, national, and international. Relations to social and political movements. Seminar format. Crosslisted with PHIL448.

**UAPP 449**  **Civil Rights Law and Policy**  
Examines the origin and evolution of the laws and policies that govern the rights of African-Americans and other people of color in the United States. Examines emerging approaches to civil rights scholarship and considers the implications of the Supreme Court’s recent embrace of a conservative posture in civil rights issues.

**UAPP 452**  **International Development Pol & Admin**  
Poverty and inequality in developing countries and the economic development policies employed to alleviate them. Emphasis on policy reform, trade strategies, sustainable development, and the role of the state. The approaches used by the World Bank, the IMF and USAID.

**UAPP 453**  **Politics and Healthcare**  
Prepares students to understand and assess the American healthcare delivery system. Examines the political dynamics involved in developing healthcare policies in both the public and private sectors.

**UAPP 455**  **Youth Street Outreach**  
Implements an outreach program to youth in a low income, urbanized community in Wilmington. Students trained and monitored as outreach workers by their professor and by community volunteers. Outreach workers trained to approach youth hanging out on the street, engage them (through conversation and recreational activities), identify their needs, and direct them to resources. Students keep journals to record their observations and feelings. The goal of the class is to increase social capital among youth by encouraging and facilitating youth participation in community educational, recreational, and social support services/activities. Crosslisted with SOC455.

**UAPP 456**  **Politics and Disaster**  
The politics and public administration of governmental preparedness for, and response to, natural and human-caused disasters and emergency incidents.

**UAPP 457**  **Health Policy**  
Provides students with a basic understanding of the U.S. health system and gives them practical experience in analyzing how healthcare reform and health policy more generally affect various sectors of the economy.

**UAPP 461**  **Conflict Resolution Collab Prob Solving**  
This course is will examine the nature of interpersonal conflicts in organizations and communities, and methods of resolution through negotiation and collaborative problem-solving. Students will learn how to select and apply appropriate conflict management techniques.

**UAPP 465**  **Climate Change Policy, Equity and Mitigation**  
Focuses on climate change equity, international compliance mechanisms, and US initiatives. It is designed for graduate students and advanced undergraduates who seek to gain substantive understanding of climate change policy and the means, impediments and opportunities to reaching resolution of complex international questions. Crosslisted with MAST462.

**UAPP 466**  **Independent Study**  
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**UAPP 621** **CONFLICT RESOLUTION** 1
Introduction to conflict resolution skills. Provides communication and problem solving skills designed to de-escalate conflicts and create win-win solutions. Students learn new ways of approaching conflict while gaining an understanding of their own conflict management style. Examines how these skills transfer to the workplace.

**RESTRICTIONS:** Requires permission of instructor.

**UAPP 622** **RESOURCES, DEVELOPMENT AND THE ENVIRONMENT** 3
Focusses on food, resources, energy and population issues in relationship to economic development and the global environment. Engages students in discussion and debate on sustainable development policies. Crosslisted with GEOG622.

**UAPP 623** **INDEPENDENT STUDY IN GEOGRAPHICAL INFORMATION SYSTEMS** 1
Students complete self-paced individualized tutorials and apply knowledge in a project of their choice. Material addressed includes creation and display of digital maps and data bases, preparation of data sets, sources of data and GIS standards.

**UAPP 625** **ENERGY POLICY AND ADMINISTRATION** 3
Analyzes energy use and energy policy with respect to politics, society, economics, political economy, technology, resources, and environment. Focuses on interrelationships among energy, environment, economy and equity (E4). It considers the energy policy options needed to achieve a more sustainable world. Crosslisted with ENEP625.

**UAPP 627** **WORLD HERITAGE SITES** 1
Goals and political context of UNESCO's World Heritage program, UNESCO activities related to that program, process of nomination of new sites for the World Heritage List, and cultural and preservation issues presented by world heritage sites in a variety of regions and countries.

**UAPP 629** **HISTORIC PRESERVATION THEORY AND PRACTICE** 3
Analysis of the theory underlying historic preservation in the United States and globally, including its history and evolution over time. Examines the impact of preservation laws and public policies, and the strategies and regulations for identifying significant structures, sites, and cultural heritage worthy of preservation. May be crosslisted with HIST652, MSST629.

**UAPP 630** **METHODS IN HISTORIC PRESERVATION** 3
Introduces students to the critical skills and methodologies employed in the field of historic preservation. Organization is based on the steps used in preservation planning, including survey and identification of historic resources, evaluation of significance, development of historic context, and creation of preservation treatment alternatives.

**UAPP 631** **DOCUMENTATION OF HISTORIC STRUCTURES** 3
Focuses on the process of creating a physical record of a historic structure, including preparation of scaled, annotated field notes and measured drawings in AutoCAD (plans, sections, elevations and details), architectural photography, and learning to "read" the critical features of a historic resource. May be crosslisted with HIST638.

**UAPP 636** **RESEARCH TOPICS IN HISTORIC PRESERVATION** 3
Seminar addresses a specific research issue within historic preservation including hypothesis construction, design of research methodology and evaluation of results. Emphasis on use of primary sources and application of data-base techniques. May be crosslisted with ARTH622, GEOG636, HIST636.

**UAPP 638** **WORLD CITIES IN COMPARATIVE PERSPECTIVE** 3
World city as a new and distinctively geographic urban form in the world economy. Case studies explore common features of internal structure and external relationships of world cities, their growing environmental problems and extent to which they have decoupled from national cultures and economies. Crosslisted with GEOG638.

**UAPP 639** **COMMUNITY DEVELOPMENT THEORY, CONCEPTS AND PRACTICE** 3
Explores the evolution of core principles and concepts associated with community development, examines various models of practice, and identifies and assesses current challenges and issues confronting the field in the United States.

**UAPP 640** **INTERNATIONAL DEVELOPMENT POLICY AND ADMINISTRATION** 3
Poverty and inequality in developing countries and the economic development policies employed to alleviate them. Emphasis on policy reform, trade strategies, sustainable development and the role of the state. The approaches used by the World Bank, the IMF and USAID.

**UAPP 641** **TOPICS IN NONPROFIT MANAGEMENT AND LEADERSHIP** 3
Offers an additional and advanced opportunity to delve into nonprofit management and leadership in the context of the current sociopolitical and economic environment. Expands knowledge and understanding of the issues confronting the sector as a whole and builds analytic and problem-solving skills.

**RESTRICTIONS:** May be repeated for credit when topics vary.

**UAPP 642** **STRATEGIC PLANNING FOR PUBLIC AND NONPROFIT ORGANIZATIONS** 1
Provides an introduction to the process of strategic planning and attempts to build the skills and knowledge required for carrying out strategic planning in private nonprofit and public agencies. Focuses on the organizational environments in which planning takes place, examines the theories which underlie planning in general and strategic planning in particular and presents a usable model for strategic planning.

**UAPP 643** **HISTORIC ROADSIDE ARCHITECTURE** 3
Examines various historic hospitality and retail venues with emphasis on their development throughout this automobile based century. Hotels, motels, diners, fast food and full service restaurants, roadside attractions and retail outlets are discussed as they relate to travel and tourism. May be crosslisted with.

**UAPP 644** **GRANTSMANSHIP AND PROPOSAL WRITING** 3
Helps public and nonprofit managers hone their abilities to successfully secure grant funding. Sessions cover currently available resources for identifying promising targets for one's grant proposal, do's and don'ts in dealings with foundations, what grantmakers really look for in a winning grant proposal, and strategies for transforming an idea into a feasible proposal capable of effectively attracting grant support.

**UAPP 648** **ENVIRONMENTAL ETHICS** 3
Ethical problems associated with environmental protection, local, national, and international. Relations to social and political movements. Seminar format. Crosslisted with PHIL648.

**UAPP 649** **CIVIL RIGHTS LAW AND POLICY** 3
Examines the origin and evolution of the laws and policies that govern the rights of African-Americans and other people of color in the United States. Examines emerging approaches to civil rights scholarship and considers the implications of the Supreme Court's recent embrace of a conservative posture in civil rights issues. May be crosslisted with BAM649, LEST649.

**UAPP 650** **VALUES AND ETHICS OF LEADERSHIP** 3
Looks at the "ends" served by leaders in various contexts (including government, nonprofits, business, and media) and the ethical standards by which the leaders' actions are judged. Examines cases of unethical conduct as well as cases of exemplary conduct.

**UAPP 652** **GEOGRAPHIC INFORMATION SYSTEMS IN PUBLIC POLICY** 1
Hands-on introduction to Geographic Information Systems (GIS) and their uses in public policy areas. Content varies. Exercises focus on using geographic data in fields such as environmental analysis, land use planning, and socio-economic analysis.

**UAPP 653** **POLITICS AND HEALTHCARE** 3
Prepares students to understand and assess the American healthcare delivery system. Examines the political dynamics involved in developing healthcare policies in both the public and private sectors.

**UAPP 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 crosslisted with ARTH654, HIST654, MSST654.

**UAPP 655** **GEOGRAPHIC INFORMATION SYSTEMS IN THE PUBLIC AND NONPROFIT SECTORS** 3
Introduction to the use of Geographic Information Systems (GIS) in urban planning and water-resources fields. Emphasis on practical experience in developing research methodologies employing GIS techniques. Topics include data/metadata creation, remote sensing as it relates to GIS, cartographic representation of spatial data, and vector/raster spatial modeling. No previous GIS experience required.
UAPP 657  HEALTH POLICY  3
Provides students with a basic understanding of the U.S. health system and gives them practical experience in analyzing how healthcare reform and health policy more generally affect various sectors of the economy.

UAPP 661  COMPARATIVE PUBLIC ADMINISTRATION AND POLICY  1
Examines contemporary experience in public administration and policy in other cultures and systems.

UAPP 663  DECISION TOOLS FOR POLICY ANALYSIS  3
Develops quantitative decision-making skills for science and technology policy decisions. Covers decision-making under uncertainty, axioms of decision analysis, decision trees, influence diagrams, sensitivity analysis, confidence intervals, value of information, probabilistic risk assessment, and multi-attribute decision theory. Crosslisted with MAST663.

UAPP 664  CASE STUDIES IN STATE AND LOCAL MANAGEMENT  3
Uses analyses of cases in state and local decision making to enable students to improve their communication, decision making and management skills. Cases deal with a broad range of subject areas (e.g., health and recreation) and problems (e.g., facility location and personnel).

UAPP 665  CLIMATE CHANGE: POLICY, EQUITY AND MITIGATION  3
Focuses on climate change equity, international compliance mechanisms, and US initiatives. It is designed for graduate students and advanced undergraduates who seek to gain substantive understanding of climate change policy and the means, impediments and opportunities to reaching resolution of complex international questions. Crosslisted with MAST662.

UAPP 666  SPECIAL PROBLEM  1-12

UAPP 668  GOVERNMENT BUDGETS AND FISCAL FEDERALISM  3
Examines policy and management of U.S. fiscal institutions and practices, including process and politics of government budgeting; intergovernmental grants and fiscal relationships; long-term fiscal planning, entitlements, and debt finance; and the analysis and design of governmental and intergovernmental fiscal institutions.

UAPP 672  NONPROFIT ORGANIZATIONS: SCOPE, FRAMEWORKS AND DYNAMICS  3
Addresses the size, scope, subcomponents, and legal framework of the nonprofit sector, as well as the traditions, values, roles and functions of nonprofits in today's environment.

UAPP 673  GOVERNING NONPROFIT ORGANIZATIONS  3
Addresses governance issues facing nonprofit executives and governing boards. Topics include board relationships and voluntary leadership, board development, advocacy, records management and the use of information technology in management and governance, and other key challenges to the nonprofit sector.

UAPP 674  STRATEGIC FUNDRAISING AND MARKETING FOR NONPROFITS  3
Prepares students for advanced practice with nonprofit organizations in the interrelated areas of strategic marketing and fundraising. Provides an integrated approach to strategy, marketing and resource development with current and emerging nonprofit organizations.

UAPP 675  LAND USE AND TRANSPORTATION LINKAGES  1
Explores the linkages between land use planning and the provision of transportation infrastructure. Discussions include guest speakers who are recognized practitioners in the fields of land use and transportation planning. Land development techniques and patterns which influence transportation needs are covered. Shows how the interplay between land use patterns and transportation infrastructure influences travel and development characteristics.

UAPP 684  PERFORMANCE MANAGEMENT AND PROGRAM EVALUATION  3
Increases knowledge of tools, techniques, and definitions for performance management, and program evaluation. Introduces indicators used by government and nonprofits and their use for accountability and improved effectiveness; furthers competence in areas of strategic planning, benchmark indicators, performance measurement, and evaluation; and explores linkages and alignments of systems for improved efficiency and effectiveness.

UAPP 687  STATE GOVERNMENT POLICY AND MANAGEMENT  3
Focuses on roles and functions of United States state government. Topics include legislative policy making and operations, executive branch organization and functions, structure and role of state courts, and the role of the governor and the states in intergovernmental policy making. State government in the mid-Atlantic region will receive special attention.

UAPP 689  INFORMATION TECHNOLOGY & MANAGEMENT OF PUBLIC & NP ORGS  3
Considers the role of technology in the planning and administration of public and nonprofit organizations. Topics include technology planning and budgeting, data processing and analysis, databases, change strategy, policy issues with current and emerging technology tools for planning and management.

UAPP 690  SEMINAR: PUBLIC ADMINISTRATION  3
Introduction to the field through the scope and evolution of public administration; the institutional, structural and political contexts of policy making; the role of nonprofit organizations in public service; the relationships and values of the public and nonprofit sectors.

UAPP 691  QUANTITATIVE ANALYSIS IN PUBLIC AND NONPROFIT SECTORS  3
Study of basic research design and data analysis techniques stressing applications in the public and nonprofit sectors. Includes research design, data acquisition, measurement, descriptive statistics, data collection, probability, exploratory data analysis, hypothesis testing, simple and multiple regression, correlation, and graphical procedures.

UAPP 692  ENVIRONMENTAL VALUES, MOVEMENTS AND POLICY  3
Examines citizens' beliefs and values, voluntary environmental groups and the ways in which individuals and groups affect environmental policy. Shows how research in areas such as environmental sociology and ecological anthropology can inform policy. Crosslisted with MAST692.

UAPP 693  ECONOMICS IN PUBLIC & NONPROFIT SECTORS  3
Develops microeconomics concepts and applies them to public issues, policies, and programs. Applications deal with a wide variety of topics, including health care, education, transportation, housing, community development, energy, and the environment. Emphasizes how microeconomic analysis can enhance decision making.

UAPP 694  FINANCIAL MANAGEMENT IN PUBLIC & NONPROFIT SECTORS  3
Introduction to practical tools and concepts of financial management for public and nonprofit organizations. Topics include budgeting, capital budgeting, cost analysis, financial planning, investment decisions, debt management, financial reporting, financial statement analysis, and financial condition analysis.

UAPP 696  HUMAN RESOURCES IN PUBLIC AND NONPROFIT ORGANIZATIONS  3
Focuses on strategic human resource planning and management issues and explores the legal rights and responsibilities of employees in public and nonprofit organizations. Links critical activities like job design, recruitment/selection and compensation while strengthening performance management and productivity through appraisal and professional development. Addresses competencies to lead a diverse workforce, including volunteers. Presents regulatory process including the rule-making and adjudicatory (order-making) powers of government agencies.

UAPP 697  LEADING ORGANIZATIONS IN PUBLIC & NP SECTORS  3
Addresses the knowledge and competencies necessary to lead organizations in a networked environment that included public, nonprofit, and for profit organizations in implementing public policy and public services. Explores the evolution of the study of organizations and leadership, as well as aligning the values and ethics of multiple organizations and sectors in the networks that now shape public governance.

UAPP 698  MANAGEMENT DECISION MAKING IN PUBLIC & NP SECTORS  3
Focuses on analytical decision making within public and nonprofit organizations. Examines processes by which decisions can be made and evaluated. Emphasis on conceptual factors that provide a guide to decisions and evaluations of decision methodologies, e.g., logic models, performance measurement, program evaluation, cost-benefit/cost-effective analysis, PERT/critical path analysis.
UAPP 699 POLICY/MANAGEMENT BRIEF 2
Students write a policy or management brief which includes a statement of the problem, a review of the relevant research addressing the problem, and a proposal for action(s). Specific guidelines approved by the MPA faculty for the brief are posted on the School's web site.

UAPP 700 HISTORIC PRESERVATION CAPSTONE STUDIO 3
Capstone experience for masters students in historic preservation. Focuses on completion of a group project solving a real-world problem in historic preservation, drawing on a variety of skills such as architectural documentation, evaluation, archival research, and policy development.

UAPP 701 PUBLIC POLICY 3
This course examines the political economy of public policy, including the intersection of policy with politics and markets, and the institutional and structural dimensions of the policymaking process. The course also explores the challenges of policy implementation, and modes of policy assessment and choice.

UAPP 702 RESEARCH METHODS IN URBAN AND PUBLIC POLICY 3
This course exposes students to high quality research in the field of urban and public policy is designed and conducted, and how it can be utilized for making important decisions about the design, implementation and evaluation of projects, programs and policies.

UAPP 703 URBAN SOCIETY AND PUBLIC POLICY 3
The course focuses on how individuals and groups contribute to the metropolitan environment and how they react and adapt to their communities. It begins with an examination of city life in early decades of the twentieth century and concludes with a consideration of how globalization is transforming metropolitan communities.

UAPP 704 STATISTICS FOR POLICY ANALYSIS 3
Advanced training in applied multivariate regression for social and health science research. Topics: OLS review, limited dependent variables: various Logit and Probit models, Count Data Models, Selection and Truncated Models (Heckman, Tobit and Censored Models), Longitudinal Modeling (Panel Data, Multi-level Analysis, Survival Analysis).

UAPP 706 PLAN SUSTAINABLE COMMUNITIES & REGIONS 3
Examines theory and methods for planning for more sustainable communities and regions in a global context in the twenty-first century. Sustainable development is defined and theories of sustainable planning presented that meet goals in the areas of environment, economy, and equity (the Three Es). After discussion of issues central to sustainable planning, course looks at tools for sustainable planning and how current land use and regional planning is and can become more oriented to sustainability. The University of Delaware is featured as an example of sustainable planning.
Crosslisted with GEOG634.

UAPP 707 PUBLIC POLICY ANALYSIS 3
Develops skills in conducting and criticizing professional policy analysis. Practice application of research methodologies to analyze contemporary public problems and potential policy solutions.

UAPP 714 POLICY STUDIO 3
Capstone project for the MA in Urban Affairs and Public Policy program that will draw upon knowledge and skills developed in the first three semesters and culminate in a policy studio paper.

UAPP 715 MEDIA, CITIZENSHIP & PUBLIC POLICY 3
This course examines the structure, role, influence, and effect that the media have on public policies and the implications for citizenship.

UAPP 716 APPLIED CREATIVITY 3
Provides foundational knowledge in research and practice of creativity theory and creative problem-solving in entrepreneurial contexts. Topics include creativity processes, including creative problem solving models and methods, idea-generating techniques, and developing a creative disposition.
Crosslisted with ENTR616.

UAPP 717 DESIGN THINKING AND INNOVATION 3
Addresses the integration and application of design processes and design thinking to enhance innovation. Students engage in multidisciplinary exploration of design theory and practice, specifically applying design ideas, principles and approaches. The role of user-centered research, divergent thinking, and iteration to enhance innovation are emphasized.
Crosslisted with ENTR617.

UAPP 724 COMPARATIVE PUBLIC POLICY 3
This course examines public policy and administration in a global context, highlighting the distinctive features of policies in different nations in such areas as health, education, social services, housing, and economic development. The course compares U.S. policies and public institutions with those of other nations.

UAPP 730 TOPICS IN PUBLIC POLICY 1-3
Special topics in public policy and administration. Topics will vary. Offers an additional and advanced opportunity to delve into public policy and administration in the context of the current sociopolitical and economic environment. Expands knowledge and understanding of the issues confronting the sector as a whole and builds analytic and problem-solving skills.
RESTRICTIONS: May be repeated for nine credits when topics vary.

UAPP 733 WASHINGTON D.C. POLICY PRACTICUM 3-6
Students will live in Washington D.C. and be placed in intern positions. Class will include lectures and site visits and discussions with practitioners and instructors.
RESTRICTIONS: Approval of instructor.

UAPP 739 RENEW ENERGY AND CLIMATE: LAW, REGULATION AND ENVIRONMENT 1-3
Introduction to US laws and regulations pertaining to greenhouse gases and the generation, transmission, and integration of renewable energy into the electrical, transportation and building heat systems. Explores judicial opinions but also considers technical and scientific sources. Crosslisted with MAST639.

UAPP 755 EVALUATION MODELS AND APPROACHES 3
Using a case-based approach, the course covers major evaluation models and approaches and their implications for evaluation planning, design, and use. Provides a foundation for thoughtful, credible, and ethical evaluation practice. Crosslisted with EVAL755. PREREQ: HDFS637 or permission of instructor.

UAPP 756 ADVANCED SEMINAR IN EVALUATION 3
The seminar provides the opportunity to study selected areas of evaluation theory and practice in depth. Potential topics include mixed-method evaluation, culturally-responsive evaluation, systems theory and evaluation, evaluation in different sectors (public, private, nonprofit), and others. Crosslisted with EVAL756. PREREQ: EVAL755 or permission of instructor.

UAPP 761 CONFLICT RESOLUTION COLLAB PROB SOLVING 3
This course is will examine the nature of interpersonal conflicts in organizations and communities, and methods of resolution through negotiation and collaborative problem-solving. Students will learn how to select and apply appropriate conflict management techniques.

UAPP 800 RESEARCH METHODS AND DATA ANALYSIS 4
Focuses on concepts, issues and techniques related to research design, data acquisition and data analysis in the fields of urban affairs and public policy.

UAPP 801 PROCESSES OF SOCIAL INQUIRY 3
Explores philosophical underpinnings of social inquiry and epistemological and methodological issues surrounding development and use of social research. Encourages students to consider role of critical analysis in social change. Students prepare research designs on topics of their choosing and are assisted by instructors in developing them into thesis and dissertation proposals.

UAPP 802 ELECTRICITY POLICY AND PLANNING 3
Analyzes the technological and regulatory policy evolution of the electricity industry. Considers how technology innovations and policy/regulatory actions have guided the planning of the industry from its early days.
Crosslisted with ENEP802.

UAPP 808 QUALITATIVE METHODS FOR PROGRAM EVALUATION 3
Provides skills and examines issues in use of qualitative methods in context of program evaluation. Qualitative design, sampling approaches, data collection, and analysis included.
RESTRICTIONS: Enrollment limited to 15.

UAPP 810 POLITICAL ECONOMY OF THE ENVIRONMENT 3
Reviews major theories developed over the last half century to explain nature-society relations. Policy case studies on environmental justice, trade and environment, global climate change, and sustainable development used to evaluate current range of political-economic explanations of nature-society relations. International, national and local responses to these problems are analyzed.
Crosslisted with ENEP810.
UAPP 818  ENVIRONMENTAL POLITICS AND POLICY  3
U.S. and international environmental politics, policies, laws, and agreements regarding air, water, and natural resource protection. Examines environmental governance regimes, politics and science, theories of environmental policy, public and private interaction, and epistemic communities in global warming, ozone layer protection, environmental public health, etc.
Crosslisted with POSC818.

UAPP 820  INTERNATIONAL PERSPECTIVES ON ENERGY AND ENVIRONMENT  3
Policy analysis and political economy at international energy and environmental issues and problems. Encompasses international and multi-national government and private sector organizations, as well as non-governmental, non-profit organizations.
Crosslisted with ENEP820.

UAPP 821  PROSEMINAR: TECHNOLOGY, ENVIRONMENT AND SOCIETY  3
Over the last two centuries, forces of industrialization and urbanization have transformed economic, social and political life and the natural environment. Examines theories that explain and assess these transformations, with the goal of fostering critical analysis of social and environmental transformation in international, national and local contexts.
Crosslisted with ENEP821.

UAPP 822  PROSEMINAR IN GOVERNANCE, PLANNING AND POLICY  3
Deals with policy and research issues concerning the making, administering and outcomes of public policies affecting urban populations and with how urban governance, planning and management processes are influenced by the interaction of the public, private and third sectors at the local, national and international scales.

UAPP 823  PROSEMINAR: SOCIAL AND URBAN POLICY  3
Social policy attempts to promote the well-being of individuals, families and communities through public action. Explores efforts to address social and economic problems in urban society. Considers differential policy impacts by social class, race/ethnicity, gender and age. Topics: welfare, housing, social security, health, education, criminal justice and employment.
May be crosslisted with EDUC825, HDFS823.

UAPP 824  SUSTAINABLE ENERGY POLICY AND PLANNING  3
Analyzes sustainable energy strategies in terms of their technology, economics, impacts on the environment and governance attributes. Also analyzes policy options to facilitate a sustainable energy future.
Crosslisted with ENEP824. RESTRICTIONS: Graduate students with a background in policy, economics and/or technology. Senior-level undergraduate students only with permission of the instructor.

UAPP 830  PROSEMINAR PUBLIC MANAGEMENT AND LEADERSHIP  3
Reviews theories, concepts, and research in the fields of public management leadership and focuses on emerging areas of scholarship and practice. Draws from interdisciplinary literature in the areas of public administration, organizational behavior and leadership, and management science and practice. Attention is focused on organizational performance, management effectiveness, organizational change and institutional responsiveness. Addresses the linkages of public management leadership to democratic and participatory institutions at all levels of community, from organizations to nations.

UAPP 860  INTERNSHIP SEMINAR  1
Involves the submission of a work plan supervisory assessment and reflective paper following the completion of a three-month (or equivalent) fieldwork experience that has been approved by the SPPA Internship Coordinator. An MPA requirement.

UAPP 861  ACADEMIC AND PROFESSIONAL DEVELOPMENT FOR UAPP DOCTORAL STUDENTS  1 PF
Explores a range of topics related to academic processes and professional development for doctoral students. Topics may include: strategies for successful graduate study, advisor/committee strategies, topic selection, the research experience, writing skills, time/stress management strategies, conference presentations, publishing, job searches, professional organizations and networking. Guest speakers include various faculty members, students and alumni.
RESTRICTIONS: Open only to UAPP doctoral students.

UAPP 862  TEACHING PRACTICUM IN URBAN AFFAIRS AND PUBLIC POLICY  3 PF
In consultation with a SUAPP faculty member and based on the student's long-term goals and professional background, the student participates in the development (or revision) and teaching of a course. Exposes Ph.D. students who anticipate teaching careers to the pedagogical issues, and planning and implementation of course instruction.
PREREQ: One semester of Ph.D. graduate study. RESTRICTIONS: Requires permission of academic advisor and faculty member sponsoring practicum.

UAPP 863  DOCTORAL DISSERTATION PROPOSAL  3 PF
Requirement of the doctoral program. A "defensible dissertation proposal” must be achieved for successful course completion.
RESTRICTIONS: Ph.D. students only.

UAPP 864  INTERNSHIP FIELDWORK  2
Three-month (or equivalent) compensated fieldwork, followed by the submission of a reflective paper. Requires prior approval of the SUAPP Internship Coordinator, completion of a work plan, and a professional performance evaluation by the site supervisor.
PREREQ: UAPP860.

UAPP 865  DISSERTATION PROPOSAL PRACTICUM  3 PF
Workshop for students in the PhD program in Urban Affairs and Public Policy on the preparation of their doctoral dissertation proposals.

UAPP 866  SPECIAL PROBLEM  1-12

UAPP 868  RESEARCH  1-6

UAPP 869  MASTER’S THESIS  1-6

UAPP 870  READINGS  1-6

UAPP 872  ANALYTICAL PAPER  3
Demonstrates the student's ability to analyze a particular policy or administrative problem and develop an appropriate response.
RESTRICTIONS: A requirement of the M.A. program.

UAPP 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.

UAPP 969  DOCTORAL DISSERTATION  1-12 PF

UNIV 100  HONORS FIRST YEAR EXPERIENCE  0 PF
Students are asked to reflect upon changes in their knowledge, skills, and attitudes that occur during their Honors First Year Experience.

UNIV 101  FIRST YEAR EXPERIENCE I  1 PF
Provides an integrated, content-based, co-curricular experience for first year students. Fosters academic and social competencies necessary for university success and provides structured, regular time for first year students to meet with faculty and peer mentors.
RESTRICTIONS: For freshmen only.

UNIV 102  FIRST YEAR EXPERIENCE II  1 PF
Continuation of UNIV101.
PREREQ: UNIV101

UNIV 103  FIRST YEAR EXPERIENCE III  1 PF
Continuation of UNIV102.
PREREQ: UNIV102.

UNIV 104  SOPHOMORE SEMINAR  1 PF
To give students a better understanding of academic skills and interests so that they can develop a plan of action in selecting a major. To help students redefine academic skills necessary for success in junior and senior level courses. Introduce additional Newark Campus resources.

UNIV 110  ETE SCIENCE SEMESTER  0

UNIV 112  SKILMOD: ACADEMIC SELF MANAGEMENT  1 PF
Focuses on self-organization and growth in a college environment. Students investigate the nature of a university, learn how to maximize their productivity through time-management and careful decision-making and examine what a liberal arts education can mean to them.
UNIV 113  SKILMOD: STUDY SKILLS  1 PF
Teaches strategies for understanding and remembering college lectures and text materials. Strategies include identifying the underlying discourse structure of the field, summarizing, comprehension monitoring and transforming notes into test formats. Students practice on their own course materials.

UNIV 114  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.

UNIV 115  SKILMOD: PROBLEM SOLVING  1 PF
Teaches problem-solving strategies for college courses in chemistry, physics, economics, engineering, etc. Students learn methods for breaking problems into manageable components and for using example problems strategically. Students apply these techniques to courses they are currently taking.

UNIV 116  FYE: STRATEGIES FOR ACADEMIC SUCCESS  1 PF
The first-year seminar for Associate in Arts freshmen, this course addresses the freshman transition. Topics include information on UD resources as well as effective study skills and time management techniques.
RESTRICTIONS: Enrollent restricted to first-year Associate in Arts students. Cannot be repeated for credit. Duplicate credit with UNIV101.

UNIV 117  EXPLORING YOUR ACADEMIC PATH  1 PF
Assists students experiencing difficulty with selecting a major. Self-exploration exercises, a review of academic resources and exposure to the many majors at UD enable each student to understand the components that lead to appropriate academic decisions. Students are also given the tools to develop a plan of action for selecting and seeking admission to their desired major.
RESTRICTIONS: Open to University Studies Freshmen.

UNIV 118  LEARNING, SERVING, GIVING BACK  1 Instruction centers on developing critical thinking and leadership skills in Student Support Services Program students. Collaborative community service projects will encourage them to connect their responses to the challenges they encounter as a result of these activities with the academic challenges they face as students.
RESTRICTIONS: Course is limited to participants in Student Support Services Program (SSSP), with preference given to freshmen and sophomores. Maximum enrollment of 10. May be repeated one time for credit.

UNIV 119  SPECIAL PROBLEM  1-4

UNIV 216  SOPHOMORE SEMINAR FOR ASSOCIATE IN ARTS PROGRAM 1 PF
Designed for sophomores in the last semester of their Associate in Arts Degree program. Focus is to facilitate the transition to a bachelor's degree program on the University of Delaware's Newark campus.
RESTRICTIONS: Open only to sophomores in the Associate in Arts Program.

UNIV 240  PEER TUTOR PRACTICUM I  0-1 PF
Focus on strategies for individual and group tutorials for tutors in Academic Enrichment Center tutoring program.
RESTRICTIONS: Not open to freshmen. Requires permission of instructor.

UNIV 260  EXPERIENTIAL TEACHING  0-3 PF
Teaching experience as group tutor, peer facilitator/instructor, workshop guide, or undergraduate teaching assistant. Leadership skills developed and applied in laboratory, problem-based learning (PBL), or peer- led team learning mode of instruction in an undergraduate course. Evaluation based on preparation and engagement in teaching and leadership process.
RESTRICTIONS: Requires permission of instructor. May not substitute major courses required in department curriculum.

UNIV 262  EXPERIENTIAL LEARNING  0-6
Learning experience on or off campus under supervision of faculty member. Instructional learning out of class and beyond existing department courses. Non-major required discovery learning experiences such as service learning, fieldwork, co-op, apprenticeship, internship, and independent study.
RESTRICTIONS: Requires permission of instructor. May not substitute major courses required in department curriculum.

UNIV 266  SPECIAL PROBLEM  1-3

UNIV 268  UNDERGRADUATE RESEARCH  0-6
Undergraduate research conducted on or off campus, out of class, and under the supervision of a faculty member.
RESTRICTIONS: Requires permission of instructor. May not fulfill course requirements in a major curriculum except by departmental permission.

UNIV 301  PEER PRACTICUM I  1
Seminar for peer mentors working in the FYE program. Covers issues of peer activities in FYE seminars.

UNIV 302  PEER PRACTICUM II  1
Continuation of UNIV301.
PREREQ: UNIV301

UNIV 303  PEER PRACTICUM III  1
Continuation of UNIV302.
PREREQ: UNIV302

UNIV 304  PEER PRACTICUM IV  1
Continuation of UNIV303.
PREREQ: UNIV303

UNIV 305  PEER PRACTICUM V  1
Continuation of Peer Mentor Practicum IV.
PREREQ: UNIV304

UNIV 320  CONTEMPORARY ISSUES FOR RESIDENT ASSISTANTS I  1
Designed to provide new RAs with opportunities to explore topics that are relevant to their jobs but which are beyond the scope of traditional RA training. In partnership with faculty lecturers, students are provided with opportunities to understand a variety of issues facing the students they work with on their floors; explore how experiences shape their views of others; and explore concepts of citizenship and community.
RESTRICTIONS: Must be a resident assistant.

UNIV 321  CONTEMPORARY ISSUES FOR RESIDENT ASSISTANTS II  1
Discovery learning experience for resident assistants in their second, third, or fourth semesters as RAs. Explores concepts of citizenship, leadership, and community through self reflection and service learning experiences within the context of the Resident Assistant position.
PREREQ: UNIV320. RESTRICTIONS: Must be resident assistants.

UNIV 322  CONTEMPORARY ISSUES FOR RESIDENT ASSISTANTS III  1
Advanced discovery learning experience for resident assistants in their third or fourth semesters as RAs. Explores concepts of citizenship, leadership, and community through self reflection and service learning experiences and apply these concepts to civic engagement and issues of sustainability.
PREREQ: UNIV320, UNIV321. RESTRICTIONS: Must be a resident assistant.

UNIV 335  ORIENTATION LEADER TRAINING COURSE  1 PF
Prepare student staff for their role as an Orientation Leader. The course covers topics of orientation programming, leadership skills, student development, diversity, and special topics as it relates to students being an active member of the Orientation Leader team.
RESTRICTIONS: Requires permission of instructor.

UNIV 340  PEER TUTOR PRACTICUM II  0-1 PF
Continuation of UNIV240.
PREREQ:UNIV240. RESTRICTIONS: requires permission of instructor.

UNIV 355  SEMESTER IN WOLVERHAMPTON  0

UNIV 360  EXPERIENTIAL TEACHING  0-3 PF
Teaching experience as group tutor, peer facilitator/instructor, workshop guide, or undergraduate teaching assistant. Leadership skills developed and applied in laboratory, problem-based learning (PBL), or peer-led team learning mode of instruction in an undergraduate course. Evaluation based on preparation and engagement in teaching and leadership process.
RESTRICTIONS: Requires permission of instructor. May not substitute major courses required in department curriculum.

UNIV 361  SERVICE-LEARNING  0 PF
Students are asked to reflect upon changes in their knowledge, skills, and attitudes that occur as a result of participation in their service-learning experience.

UNIV 362  EXPERIENTIAL LEARNING  0-6
Learning experience on or off campus under supervision of faculty member. Instructional learning out of class and beyond existing department courses. Non-major required discovery learning experiences such as service learning, fieldwork, co-op, apprenticeship, internship, and independent study.
RESTRICTIONS: Requires permission of instructor. May not substitute major courses required in department curriculum.

UNIV 363  EXPERIENTIAL LEARNING SUSTAINING  0 PF
Experiential learning under the supervision of a faculty mentor.
RESTRICTIONS: Limited to students appointed as Experiential Learning Scholars within the Discovery Learning Experience. Must have approval of the Associate Director of Undergraduate Studies.
### Undergraduate Experience

**UNIV 364** **EXPERIENTIAL INTERNSHIP** 3

Internship experience of a minimum of fifty hours combined with a seminar emphasizing career development, reflection, and personal assessment. Internship must be arranged and Learning Contract signed by internship supervisor prior to first class meeting. Open to major and non-major related internships.

**RESTRICTIONS:** Class may be taken a second time for additional three elective credits with a different internship and a different instructor. Distance option may be available if student is pursuing an internship at a distance of fifty or more miles from campus. May not be for credit.

**UNIV 366** **INDEPENDENT STUDY** 1-6

**UNIV 368** **UNDERGRADUATE RESEARCH** 0-6

Undergraduate research conducted on or off campus, out of class, and under the supervision of a faculty member.

**RESTRICTIONS:** Requires permission of instructor and approval of the Coordinator of Undergraduate Research. May not fulfill course requirements in a major curriculum except by departmental permission.

**UNIV 369** **UNDERGRADUATE RESEARCH SUSTAINING** 0 PF

Research apprenticeship with faculty mentor.

**RESTRICTIONS:** Limited to those appointed as Undergraduate Research Scholars in the Undergraduate Research Program. Must have approval of the Coordinator of Undergraduate Research.

**UNIV 370** **STUDY ABROAD WINTER / SUMMER** 0 PF

Students are asked to reflect upon changes in their knowledge, skills, and attitudes that occur due to their study abroad experience.

**UNIV 371** **DOMESTIC TRAVEL STUDY** 0 PF

Students are asked to reflect upon changes in their knowledge, skills, and attitudes that occur due to their domestic travel study experience.

**UNIV 372** **INTERNATIONAL EXCHANGE** 0 PF

Reflect upon changes in knowledge, skills, and attitudes that occur due to international exchange experience.

**UNIV 373** **STUDY ABROAD FALL / SPRING** 0 PF

Students are asked to reflect upon changes in their knowledge, skills, and attitudes that occur due to their study abroad experience.

**UNIV 401** **SENIOR THESIS** 2-4

Senior thesis for students working toward a degree with distinction.

**RESTRICTIONS:** Total credits for UNIV401 and UNIV402 not to exceed six.

**UNIV 402** **SENIOR THESIS** 2-4

Continuation of UNIV401.

**RESTRICTIONS:** Total credits for UNIV401 and UNIV402 not to exceed six.

**UNIV 440** **PEER TUTOR PRACTICUM III** 0-1 PF

Continuation of UNIV340.

**PREREQ:** UNIV340. **RESTRICTIONS:** Requires permission of instructor.

**UNIV 460** **EXPERIENTIAL TEACHING** 0-3 PF

Teaching experience as group tutor, peer facilitator/instructor, workshop guide, or undergraduate teaching assistant. Leadership skills developed and applied in laboratory, problem-based learning (PBL), or peer-led team learning mode of instruction in an undergraduate course. Evaluation based on preparation and engagement in teaching and leadership process.

**RESTRICTIONS:** Requires permission of instructor. May not substitute major courses required in department curriculum.

**UNIV 462** **EXPERIENTIAL LEARNING** 0-6

Learning experience on or off campus under supervision of faculty member. Instructional learning out of class and beyond existing department courses. Non-major required discovery learning experiences such as service learning, fieldwork, co-op, apprenticeship, internship, and independent study.

**RESTRICTIONS:** Requires permission of instructor. May not substitute major courses required in department curriculum.

**UNIV 468** **UNDERGRADUATE RESEARCH** 0-6

Undergraduate research conducted on or off campus, out of class, and under the supervision of a faculty member.

**RESTRICTIONS:** Requires permission of instructor and approval of the Coordinator of Undergraduate Research. May not fulfill course requirements in a major curriculum except by departmental permission.

**UNIV 490** **HONORS TUTORIAL: HUMANITIES** 3

Designated faculty direct the studies of up to four students per semester. Readings of classical works in the humanities described. Group as well as individual discussions.

**RESTRICTIONS:** Requires 3.4 GPA, junior standing or above, and permission of the Honors Program.

**UNIV 491** **HONORS TUTORIAL: NATURAL/SOCIAL SCIENCE** 3

Designated faculty direct the studies of up to four students per semester. Reading of classical works in the social and natural sciences described. Group as well as independent discussions.

**RESTRICTIONS:** Requires 3.4 GPA, junior standing or above and permission of the Honors Program.

**UNIV 495** **HONORS SEMINAR** 3-6

Topics vary; usually interdisciplinary.

**RESTRICTIONS:** Requires 3.4 GPA, junior status or above, and permission of the Honors Program. May be repeated for credit with a different topic and instructor.

**UNIV 500** **LEAVE OF ABSENCE** 0

**UNIV 554** **GRADUATE INTERNSHIP SEMESTER** 0

**UNIV 555** **ADVANCED GRADUATE STUDY** 1-3

**UNIV 566** **SPECIAL PROBLEM** 1-12

**UNIV 600** **LEARNING** 0 PF

Explores cognitive, affective and social aspects of the learning process through research and reflection on learning and teaching literature in higher education. Students develop skills to facilitate learning in their respective disciplines. Modern information technologies and library resources access essential.

**UNIV 601** **PEDAGOGY** 0 PF

Presents research-based teaching principles and innovative teaching methodologies. Offers practical orientation to enhance pedagogical effectiveness in respective disciplines. Opportunity to observe and reflect on outstanding UD faculty's instructional practices. Modern information technologies and library resources access essential.

**UNIV 602** **FACULTY ROLES** 0 PF

Introduces the range of faculty roles and responsibilities at different types of institutions. Assists with identifying ideal academic settings and understanding the possibilities and responsibilities concomitant to such appointments. Modern information technologies and library resources access essential.

**UNIV 609** **DISSERTATION DISCOURSE** 0 PF

Writing retreat designed to develop the writers' ability to set effective goals or writing intentions and to track and understand their writing process. In addition to providing a dedicated space for writing and providing tips on various dissertation writing topics, the course helps students find sustainable writing habits that move their work forward. In addition, the course develops a community of writers committed to completing their dissertations on schedule, supporting and cheering each other on, and sharing strategies and experiences to help each other navigate the dissertation process with sanity intact.

**UNIV 612** **RAISE: RESEARCH ETHICS** 0-3 PF

The RAISE (Responsibility and Integrity in Science and Engineering) seminar provides graduate instruction on research ethics and professional practice. The seminar prepares participants as future leaders of professional integrity in their fields. Issues include attribution of authorship, data falsification, conflicts of interest, plagiarism, and whistleblowing. Crosslisted with PHIL613. **RESTRICTIONS:** Consent of instructor.

**UNIV 666** **SPECIAL PROBLEM** 1-12

**UNIV 670** **STUDY ABROAD WINTER / SUMMER** 0 PF

**UNIV 866** **SPECIAL PROBLEM** 1-12

**UNIV 895** **MASTER’S SUSTAINING: NON-THESIS** 0

**UNIV 899** **MASTER’S SUSTAINING** 0
WOMS 156 THE SURPRISING AND FASCINATING STORY OF AMERICAN SEXUALITIES 3
Learn about the history of American sexuality and its importance to our politics and culture today. We will examine a variety of topics: the history of marriage and the family, pregnancy and childbirth, contraception, abortion, rape, prostitution, erotica/pornography, sexual reform and social purity, movements, sexuality and racial conflicts, sex during wartime, transsexuality, same-sex desires and communities, the sexual politics of women's emancipation, sexual diseases, sex education, sexual liberation, and the gay rights movement. Crosslisted with HIST156.

WOMS 200 CULTURAL INTRODUCTION TO SEXUALITIES AND GENDER STUDIES 3
An exploration of the variations in the social construction of lesbian, gay, bisexual, heterosexual, transsexual, transgender and queer identities and communities in contemporary American society through study of gay literature, history, theory, religious and legal issues and the arts including film, music, television, and visual arts. Crosslisted with SGST200.

WOMS 201 INTRODUCTION TO WOMEN'S STUDIES 3
Study of causes and conditions determining women's status in society, as evidenced in institutional structures and personal relations between men and women. Taught from multidisciplinary perspectives.

WOMS 202 WOMEN'S STUDIES IN GLOBAL CONTEXT 3
Examines how policies and laws promoted by national, international and transnational systems affect women's lives. Seeks to unearth the ways race, ethnicity, gender, region and culture influence women's experience from the local to the transnational level. Explores the range of women's voices, including resistance and activism.

WOMS 203 CONTEMPORARY MORAL PROBLEMS 3
The application of philosophical techniques to contemporary moral problems such as abortion, punishment, biomedical ethics, reverse discrimination and sexual morality. Crosslisted with PHIL202.

WOMS 204 GENDER AND COMMUNICATION 3
Deals with gender differences in communication in varied contexts, such as conflict, marriage, family, friendship, and work. Crosslisted with COMM204.

WOMS 205 WOMEN IN THE ARTS AND HUMANITIES 3
Interdisciplinary survey of women's contributions to the arts and humanities, also including literary/artistic images of women, contributions of minority and non-Western women, and study of the relationship between women's social-economic roles and cultural expressions.

WOMS 206 WOMEN AND WORK 3
Covers a variety of topics including women in traditional and non-traditional occupations, gender-based discrimination (wage inequities, sexual harassment, exclusionary policies), the contributions of women to the economy and the role of law in shaping conditions for women in the workplace. May be crosslisted with SOC206.

WOMS 208 CURRENT ISSUES IN SEXUALITY AND GENDER LECTURE SERIES 3-13
Lecture series in which faculty and guest speakers discuss their research on contemporary and historical perspectives on sexuality and gender. Research presented from several disciplines, including sociology, history, literature, art, music, anthropology and psychology, among others.

WOMS 210 WOMEN AND RELIGION 3
Explores the relationship between sacred text and women's religious and societal roles within Christianity, Judaism, Islam, Hinduism and Buddhism during diverse historical moments. Examine the experience of women operating within the confines of their various traditions as well as consider those who pushed the boundaries of their faith communities. Utilize a variety of feminist approaches to the study of religion. May be crosslisted with PHIL210.

WOMS 211 MEN, CONFLICT AND SOCIAL CHANGE 3
Examination of male roles and images in society, utilizing an interdisciplinary social science perspective. Topics include the family, work, military, violence and the implications of feminism for men. Issue oriented. May be crosslisted with SOC211.

WOMS 212 MOTHERHOOD IN CULTURE AND POLITICS 3
Examines contemporary cultural and political issues related to motherhood and mothering experience, including definitions and cultural significance of motherhood, experiences of childbirth, effects of new reproductive technologies, surrogate mothering and "maternal thinking." Also, efforts to avoid motherhood through contraception and abortion and related legal controversies.

WOMS 213 MEN AND WOMEN IN AMERICAN SOCIETY 3
Designed to provide students with a sociological framework for analyzing sex and gender relations in contemporary American society. Topics include the social construction of gender, patterns of sex-role socialization, gender stratification in the paid work force, gender relations in the family and other social institutions. Crosslisted with SOC213.

WOMS 216 INTRODUCTION TO FEMINIST THEORY 3
This course explores the various theoretical explorations for and solutions to gender inequality. The development of feminist theory will be presented as an intellectual history placing each theoretical framework in conversation with the others covered during the course of the semester. Students will become familiar with a variety of feminist theories including: liberal, Marxist, socialist, transnational, radical, homosexual, multicultural, psychoanalytic, cultural, standpoint, social construction, multietnic/racial, postmodern, and queer. Our understanding of these theoretical perspectives will be aided by the inclusion of current case studies and class debates. May be crosslisted with PHIL216.

WOMS 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. Crosslisted with LING222.

WOMS 223 FOOD, GENDER AND CULTURE 3
Explores how preparing, eating, and thinking about food demonstrates culturally determined gender and power relations in different societies. Using cross-cultural and interdisciplinary perspectives, explores various understandings of issues such as nutrition, eating disorders, body images, and gender differences around food. Crosslisted with ANTH223.

WOMS 240 WOMEN AND VIOLENCE 3
Analyzes a variety of issues and topics relating to women and violence, including rape, domestic violence, images of women in popular culture, incest and child abuse, pornography, sexual harassment and women who use violence. Presents descriptive material, sociological analysis and strategies for change.

WOMS 242 WOMAN AS IMAGE AND IMAGEMAKER 3
Analyzes the depiction of women in art from pre-history to the present in light of recent feminist studies. Topics correspond with particular periods in history. Each class includes a brief discussion of women artists and their works. Crosslisted with ART/H242.

WOMS 250 TOPICS IN INTERNATIONAL WOMEN'S STUDIES 3-6
Explores topics related to women's lives in various parts of the world and may include women's history, women's creativity, and social movements in Africa, Asia, Europe, Australia or Latin America. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 260 WOMEN: CULTURAL REPRESENTATIONS 3
Examines issues of representation across time and cultures. Offers critical analysis of how women have been presented and represent themselves, as well as how their cultural productions and creative labs in a variety of media have been represented by others.

WOMS 284 GENDER, CULTURE AND DIGITAL MEDIA 3
Explores the relationship between gender, culture, and digital media. May be crosslisted with COMM284.

WOMS 290 WOMEN AND GENDER IN INTERNATIONAL FILMS 1 PF
Through viewing feature films about women and/or gender in cultures outside that of mainstream United States, explores how sex and gender shape lives and experiences. Enriches understanding of the diversity of gendered cultural norms and ways filmmakers choose to illustrate them.
WOMS 291  WOMEN’S HISTORY THROUGH FILM  1
Explores women’s historical experiences through the medium of film. Students will view and discuss a variety of documentary films on women and read materials related to topics covered in the films. Films will deal with historical and contemporary issues in the United States and internationally. May be crosslisted with HIST291. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 298  RESEARCH ON RACE, ETHNICITY AND CULTURE  1 PF
Lecture series in which faculty and guest speakers discuss their research on contemporary and historical perspectives on race, ethnicity and culture. Research presented from several disciplines, including sociology, history, literature, anthropology and psychology, among others. May be crosslisted with BAMS298. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 299  RESEARCH ON WOMEN  1 PF
Interdisciplinary lectures in which faculty, staff and advanced students share results of their research on women. Lectures cover issues in anthropology, sociology, political theory, psychology, philosophy, literature, history, theology, ethnic studies, music, art, sciences, health, etc. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 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. Crosslisted with HIST300.

WOMS 301  GAY AND LESBIAN FILM  3
Explores gay and lesbian issues represented in film and an academic analysis of these issues. Through film, students study the social constructs of sexuality and gender, analyze the role of homosexuality, examine the development of gay and lesbian characterization, and explore the differences between sex and sexuality. Crosslisted with SGST301.

WOMS 302  WOMEN IN MUSIC: AN ALTERNATE SURVEY  3
Survey of women’s contributions to Western art music traditions from 12th century to present day through the study of women as composers, performers, patrons, and as the subject of musical expression. Explores cultural systems that have alternately encouraged and suppressed women’s creativity. Crosslisted with MUSC302.

WOMS 303  WOMEN IN THE HOLOCAUST  3
Examines the role of women who encountered the Holocaust. Such information has often been overlooked in the study of the Holocaust. Adding the perspective of gender will enrich our understanding and offer a more complete picture of what happened. Students will read a variety of texts, engage in group work and create a final project that demonstrates both what they have learned and what they wanted to learn about women in the Holocaust. Crosslisted with JWST303.

WOMS 304  ADOLESCENT GIRLS IN MULTICULTURAL PERSPECTIVE  3
Explores key writings on contemporary girlhood and examines various aspects of female adolescent experience across race, class, and culture in both the US and in a global context. PREREQ: Any WOMS 200-level course.

WOMS 305  THE EVOLUTION OF HUMAN SEX ROLES AND REPRODUCTION  3
Survey of the evolution of human reproduction and sex differences. Evidence derived from the human fossil record, living non-human primates, modern biological differences between human males and females and cross-cultural comparisons of reproductive behavior and sex roles. Crosslisted with ANTH305.

WOMS 308  THEORIES OF SEXUALITY AND GENDER  3
Examines the major theoretical approaches to the study of sexuality and gender with an emphasis on queer theory and intersections between sexuality, gender, race, class, and nationality. Crosslisted with SGST308.

WOMS 309  POLITICAL CULTURE BY COUNTRY  3
Introduction to the political and civic cultures underpinning and supporting different political systems. Topics may vary depending on host country. Crosslisted with POSC309. RESTRICTIONS: Offered only in conjunction with travel abroad programs. May be taken twice for credit when countries vary.

WOMS 310  WIVES, MISTRESSES, AND Matriarchs: ASIAN WOMEN’S LIVES  3
Using examples from China, Japan, Southeast Asia, South Asia, and the Middle East, examines how lives of Asian women have been constructed by cultural, historical, and international forces and seeks to understand and challenge culturally pervasive stereotypes that define their lives. Crosslisted with ANTH310.

WOMS 311  WOMEN, SOCIETY AND THE ARTS  3
Focuses on the role of women in art and society throughout the ages. Interdisciplinary and feminist readings emphasize a variety of approaches. Topics vary. Examples: Women in Antiquity, Renaissance Women, etc. Crosslisted with ANTH311. RESTRICTIONS: May be repeated for credit once when topics vary.

WOMS 312  ASIAN WOMEN IN THE GLOBALIZED WORKPLACE  3
Focuses on relationship between work, gender, and social, cultural, and economic transformations associated with globalization in East and Southeast Asia. Crosslisted with ANTH312.

WOMS 313  THEORY AND METHODS IN FEMINISM  3
Focuses on the visions and methods that feminist scholars use to study feminist issues within and across a range of disciplines. Students will read and discuss how feminist scholars rethink analytical paradigms and create new theoretical models to guide their work. Feminist theory is presented as an intellectual history placing theoretical frameworks in conversation with other perspectives. Develop a critical awareness of research methods and the research methods of others. PREREQ: Any 200-level Women’s Studies course.

WOMS 314  SOCIAL MEDIA: FEMINIST ACTIVISM  3
In less than two decades, social media and the growth of virtual networks and communities has shifted the dynamics of contemporary global society. This course traces how feminists have been using the Internet since the late 1990’s and explores contemporary feminist usage of social media. PREREQ: Any 200-level WOMS or SGST course.

WOMS 315  ANTHROPOLOGY OF TOURISM AND TRAVEL  3
Views tourism as an international industry, a cultural practice and a phenomenon of globalization. Examines such topics as tourism and modernity, sexual and romantic tourism, ecotourism and environmental tourism, tourism and “authenticity”. Crosslisted with ANTH311.

WOMS 316  ISLAM AND GENDER  3
Uses anthropological case studies and historical material to comprehend ideals, practices, and themes of gender and gender relations in Islam. Introduces representations of Islamic belief in doctrinal, historical, and contemporary contexts. Crosslisted with ANTH316.

WOMS 317  GENDER AND POLITICS  3
Engages gender as a useful lens for the broad study of politics. Includes analysis of gender in shaping personal, group, national and international interactions. Crosslisted with POSC317.

WOMS 318  STUDIES IN FILM  3
Special topics such as film genres, major directors and Soviet cinema. Crosslisted with ENGL318. PREREQ: ENGL310. RESTRICTIONS: May be taken up to three times when topics vary.

WOMS 319  TOPICS: FRENCH LITERATURE IN TRANSLATION  3
Study of the works of one or more outstanding authors or of a special theme. Taught in English. Topics vary and are announced prior to the registration period.

WOMS 320  VARYING AUTHORS AND GENRES  3
Cultural, especially cross-cultural and/or interdisciplinary studies with primary emphasis on the aesthetic context of the announced topic, e.g., Nordic Saga and Myth; Courtly Love; and the European Postwar Novel. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 321  TOPICS: CHINESE LITERATURE IN TRANSLATION  3
Study of the works of one or more outstanding authors or of a special theme. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 322  TOPICS: CLASSICAL LITERATURE IN TRANSLATION  3
Special topics in Greek and Roman and civilization. Particular areas and writers to be announced, e.g., ancient epic, ancient drama, Greek literature in translation. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 324  FEMINISM AND SEXUALITIES  3
Examines issues of sexual identity from a feminist perspective and may focus on topics such as cross-dressing, transgenderism, queer studies, etc. PREREQ: Any WOMS 200-level course.

WOMS 325  TOPICS: GERMAN LITERATURE IN TRANSLATION  3
Study of the works of one or more outstanding authors or of a special theme. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics. RESTRICTIONS: May be repeated for credit when topics vary.
WOMS 326  TOPICS: HISPANIC LITERATURE IN TRANSLATION 3-12
Study of the works of one or more outstanding authors or of a special theme. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 327  RACE, GENDER, SCIENCE 3
Critically examines a number of metaphysical, epistemological, and ethical issues related to science of race, gender, and sexual orientation. Topics may include (a) evolution of sex and gender, (b) gender and cognition, (c) biological basis, or lack thereof, of sexual orientation/preference (d) evolutionary, cognitive, historical, and political origins of race thinking, (d) relationship between everyday conceptions of race and gender as compared with scientific conceptions of race and gender, (e) ethical issues raised by human kind classification schemes. Crosslisted with PHIL327.

WOMS 328  TOPICS: JAPANESE LITERATURE IN TRANSLATION 3-6
Study of the works of one or more outstanding authors or of a special theme. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 329  TOPICS: ITALIAN LITERATURE IN TRANSLATION 3
Study of the works of one or more outstanding authors or of a special theme. Taught in English. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 330  VARYING AUTHOR, THEMES, AND MOVEMENTS 3
Cultural, especially cross-cultural, study with primary emphasis on the historical development of the announced area, e.g., The Faust Theme in Western Literature, Dante Through the Ages, Don Juan, and the Transformation of a Myth. See http://primus.nss.udel.edu/CoursesSearch/ for topics. RESTRICTIONS: May be repeated three times for credit when topics vary.

WOMS 332  WOMEN, RACE, AND ETHNICITY 3
Examines intersection of gender with issues of racial and ethnic identity in either national or transnational context. PREREQ: Any WOMS 200-level course.

WOMS 333  PSYCHOLOGY OF WOMEN 3
Psychological analysis of the meaning and implications of being a woman and consequences of the female experience. Biological sex vs. psychological sex-role identity, stereotyping, discrimination, self-concept and the feminist perspective. Crosslisted with PSYC333. PREREQ: PSYC100

WOMS 334  AFRICAN AMERICAN WOMEN'S HISTORY 3
Explores the diversity of African American women's lives and development of women, work, and culture from the colonial era through the late 20th century. Examines the social, political, religious and economic factors affecting change and transformation in the lives of African American women. Provides a broad introduction to the interdisciplinary field of African American and Women's Studies. Crosslisted with HIST334.

WOMS 336  FEMINIST CULTURAL STUDIES 3
Situates cultural forms created by women in historical context. Novels, poems, television, plays, rituals, film, paintings, music, electronic media, technology, sculpture, food, clothing and/or architecture reveal perspectives of women's time, class, nation, race, and ethnicity. Relates feminism, gender and the production of culture. PREREQ: Any WOMS 200-level course.

WOMS 337  STUDIES IN VICTORIAN LITERATURE 3
Studies of significant British texts from the nineteenth century, the social forces they shaped, and those by which they were shaped. Content varies by expertise of instructor. Crosslisted with ENGL338. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

WOMS 350  GENDER AND CRIMINAL JUSTICE 3
Reviews historical and contemporary explanations for women's participation in crime and evaluates these explanations in light of current research on gender. Other topics include treatment of women offenders by judicial and correctional systems, women as victims of crime and women as criminal justice personnel. Crosslisted with CRJ350.

WOMS 352  STUDIES IN NINETEENTH CENTURY LITERATURE 3
Special topics in an author or authors, a genre, literary movement, or an idea. Crosslisted with ENGL352. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

WOMS 353  TWENTIETH CENTURY BRITISH LITERATURE 3
Broadly focused study of literature in several genres, including a variety of eras and movements such as turn-of-the-century realism, war poetry, modernism, and post-colonial writing. Crosslisted with ENGL353. PREREQ: ENGL110

WOMS 361  FEMINIST POLITICAL THEORY 3
Overview of feminist political theory examining the ways that gender has shaped politics including topics such as the public/private distinction, family politics, economics, sexual violence, and exclusion. Considers how questions of gender intersect with other forms of identity in the U.S. and globally. Crosslisted with POSC361.

WOMS 362  BLACK FEMINIST THEORY 3
Explores black women and their struggles to define and re-define themselves in the US, from slavery to the modern era. Examines the historical evolution of black feminist theory starting with slave narratives and ends with contemporary readings. Crosslisted with BAMS352.

WOMS 363  WOMEN IN CROSS-CULTURAL PERSPECTIVE 3
Social realities of women within the cultures of Asia, Africa and Latin American societies. How institutions such as motherhood, the family, sexuality and work structure women's lives within the dominant social ideologies. May be crosslisted with ANTH363.

WOMS 366  INDEPENDENT STUDY 1-6

WOMS 370  PRISON AND PRISON SUBCULTURES 3
Provides an intensive examination of the social organization of prisons. Mainly examines how the prisoner subculture shapes and is shaped by social institutions. Special emphasis on how gender and race contribute to differential patterns of adjustment to incarceration. Crosslisted with CRJU370.

WOMS 372  JAPAN'S GLOBAL POP CULTURE 3
The course asks the question, what is Japanese about global popular culture? It explores the theory and practice of global popular culture as it emerges from the history of popular culture in Japan from the eighteenth to the twenty-first century. Topics include entertainment, sports, mass media, tourism, fashion, consumerism, sexuality and gender. The course combines lecture and discussion with intensive reading and writing. Crosslisted with HIST372.

WOMS 375  TOPICS: RUSSIAN AND SOVIET CULTURE IN TRANSLATION 3
Special topics in Russian and Soviet culture. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 380  WOMEN WRITERS 3
Study of a variable set of women writers. Addresses such topics as the idea of a women's tradition, formation of the canon, use of genre, language and form. Crosslisted with ENGL380. PREREQ: ENGL110.

WOMS 381  WOMEN IN LITERATURE 3
Cultural representations of women by male as well as female writers. Variable in historical range, geography, and genre. Crosslisted with ENGL381. PREREQ: ENGL110. RESTRICTIONS: May be taken up to two times when topics vary.

WOMS 382  STUDIES IN MULTICULTURAL LITERATURE IN ENGLISH 3
Consideration of multiculturalism as it pertains to American culture or literature in English from Africa and other non-European societies. Variable in historical range, geography, and genre. Crosslisted with ENGL382. PREREQ: ENGL110. RESTRICTIONS: May be taken up to three times when topics vary.

WOMS 383  CHINESE CULTURE IN TRANSLATION 3
Special topics in Chinese culture. Taught in English. See http://primus.nss.udel.edu/CoursesSearch/ for topics. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 385  WOMEN AND THE ECONOMY 3
Examines a wide range of economic issues relating to women's lives, with special emphasis on family, work and income. Public policy applications and international comparisons are stressed. Crosslisted with ECON385. PREREQ: ECON101.

WOMS 387  HISTORY OF SEXUALITY IN THE U.S. 3
A survey of American sexual ideals, practices, and identities, from the Colonial period to the present. How anxieties about interracial sex shaped life in the American South, how the advent of more reliable contraceptives provoked both social movements and political debate, and how the emergence of a scientific discourse of sexual difference simultaneously propelled the gay rights movement and enabled scientists to categorize same-sex love as pathology and perversion. Crosslisted with HIST387.
WOMS 389 TOPICS: WOMEN AND HEALTH ISSUES 3
Varying special topics related to women's health. Topics may include, but are not limited to: the relationship between women, health and development; theoretical contributions of feminism to thinking about relationship between gender and health; women's health conditions in various parts of the world. May be crosslisted with PHIL389. PREREQ: Any WOMS 200-level course. RESTRICTIONS: May be repeated for credit when topics vary.

WOMS 398 TOPICS IN MEDIEVAL HISTORY 3
Course topics vary and may be chronologically or thematically based. Examples include "Christians & Muslims in the Middle Ages" and "Germany in the Middle Ages." May be repeated for credit when topics vary. Crosslisted with HIST398.

WOMS 401 FOUNDATIONS OF HUMAN SEXUALITY 3
A multidisciplinary study of human sexuality focusing on the implications for individuals and society of the biological, psychological and sociocultural determinants of human sexuality. Deals with sexually explicit material. Crosslisted with HDF5401.

WOMS 402 TOPICS IN LAW AND POLITICAL 3
Critical topics in law and political. Topics will vary. Crosslisted with POSC401. RESTRICTIONS: May be taken twice for credit when topics vary.

WOMS 407 SOCIOLOGY OF SEX AND GENDER 3
Seminar on sex and gender relations from a sociological perspective. Surveys current research on gender stratification in the paid work force, the feminization of poverty, gender relations in the family, sexual violence, and feminism as a social movement. Special attention given to current theoretical debates on the origins and persistence of sexual inequality and the intersection of gender with race and class in patterns of social stratification. Crosslisted with SOCI407. PREREQ: SOCI201, and either SOCI213 or WOMS5201. RESTRICTIONS: Restricted to junior and senior sociology and women's studies majors.

WOMS 408 DOMESTIC VIOLENCE POLICY AND PREVENTION 3
Reflects the current state of policy and practice among policy makers and practitioners in the field of domestic violence including legal issues, policy development, primary prevention, and models of best practice. Addresses the role of federal and state law. May include economic justice, mental health and trauma, and alternative models. May be crosslisted with CRJU408, HDFS408, SOCI408. PREREQ: Any 200-level Women's Studies course.

WOMS 409 DOMESTIC VIOLENCE SERVICES 3
Examines issues in providing services to families in which domestic violence is occurring. Multiple service systems are explored, with emphasis on service coordination, service gaps, and public policy. Crosslisted with HDF5409. RESTRICTIONS: Open to juniors and seniors only.

WOMS 410 THE STUDY OF WOMEN'S STUDIES 3
Capstone for majors. Explores purpose, development, and developing concerns in field of women's studies. Aims to reflect upon what majors have learned in their WOMS classes, consider ongoing challenges to the field, and help prepare them for a future in which their WOMS major can play a significant and positive role. RESTRICTIONS: Senior majors. Requires approval of women's studies advisor and instructor.

WOMS 411 SEMINAR IN AMERICAN HISTORY 3
Topics vary. Recent topics include Jefferson and His Time, Women in 20th-Century America, The Nightmare Years: The U.S. 1960 to 1980, American Religious History and Conservatism in Recent America. Crosslisted with HIST411. PREREQ: HIST268 RESTRICTIONS: Majors only, or permission of instructor.

WOMS 412 RACE AND SEXUALITY 3
Examine sexuality as a structure of power and identity. Study how race is sexualized and sexuality is racialized. Explore the impact of binary thinking (white/non-white, straight/gay) on social relationships. The perspective of racial minorities, particularly African-Americans, is emphasized. Review research on culture, history, and policy. Crosslisted with SOCI420. PREREQ: SOCI201

WOMS 413 TOPICS IN AMERICAN POLITICS 3
Contemporary topics in American government and politics. Crosslisted with POSC413. RESTRICTIONS: May be taken twice for credit when topics vary.

WOMS 414 WOMEN AND GENDER IN HEALTHCARE 3
Explores women's healthcare issues from the perspective of gender needs within our healthcare delivery system. Global issues related to cultural needs, health beliefs and practices, lifespan and lifestyle considerations, wellness goals, and health issues unique to women are the focus of content. Crosslisted with NUR541A. RESTRICTIONS: Open to nursing, health studies, and women's studies majors and minors, or by permission of instructor.

WOMS 415 RACE, CLASS, AND GENDER 3
Analysis of current American social issues that show interrelationship of race, class and gender. Readings from sociology, Afro-American studies, feminist studies, history and literature. Crosslisted with SOC415.

WOMS 417 SEX CRIMES AND PUNISHMENTS 3
Discuss controversial topics surrounding sex crimes and punishments to develop students' abilities to think critically about connections between three areas: how we as a society respond to crime through our criminal justice systems; what we believe about crime and punishment; and what empirical research tells us. Crosslisted with CRJU417.

WOMS 418 RACE, GENDER, AND POVERTY 3
An examination of contemporary American poverty with attention to race and gender as fundamental dimensions of inequality. Social policy, employment and family composition are key topics. Crosslisted with SOC418. PREREQ: SOC420.

WOMS 419 SOCIAL PSYCHOLOGICAL ASPECTS OF CLOTHING 3
Study of clothing and appearance as contributors to human interactions; consideration of the importance of clothing in individual and collective behavior. Analysis of how dress reflects self-feelings, establishes social identities and affects interpersonal encounters. Crosslisted with FASH419. PREREQ: PSYC100 and SOC420, or permission of instructor.

WOMS 420 WOMEN'S STUDIES SENIOR THESIS 3-6
Senior thesis for women's studies majors or minors. COREQ: Students enrolled in WOMS420 must also take WOMS410 the same semester or the following semester. RESTRICTIONS: Women's studies majors or minors and permission of the WOMS program.

WOMS 424 WOMEN IN LITERATURE AND SOCIETY 3
This INSIDE/OUT class focuses on deep reading of several form of literature. The class investigates the role of women in literature as authors, readers and central characters, and uses literature as a window into social views of gender. Assigned material explores the particular themes of voice, agency, cultural difference and social structure. Crosslisted with CRJU424. RESTRICTIONS: Permission of instructor.

WOMS 425 SOCIOLGY OF THE BODY 3
Examines the body, not through the lens of the biological sciences, but as the product of complex social arrangements and processes. Considers: What is ‘natural’ about bodies? How are bodies commodified? How are bodies categorized and constituted by discourses of race, class, gender, sexuality, and biomedicine?. Crosslisted with SOC425. RESTRICTIONS: Not open to freshmen.

WOMS 430 FAMILY LIFE EDUCATION 3
Investigates curriculum and instructional strategies for use in support, prevention and empowerment-based programs across the lifespan. Crosslisted with HDF5430. PREREQ: HDF5201 or HDF5202.

WOMS 433 GENDER AND HEALTH 3
Why are women sicker, but men die younger? In this course we will critically examine the relationship between gender and health. In doing so, we will also consider the contribution of race, class and sexuality in shaping that relationship. Crosslisted with SOC433. RESTRICTIONS: Not open to Freshmen due to the rigorous seminar format, higher-order thinking, and writing requirements in the course.

WOMS 436 POLITICS AND LITERATURE 3
Explores the contributions of literature – in various forms including the literary genre of film - to the study of politics. Facilitates a better understanding of national or international politics through the voices of acclaimed authors. Regional or temporal focus will vary. Crosslisted with POSC436. RESTRICTIONS: May be repeated once for credit when topics/countries differ.

WOMS 439 WOMEN AND REVOLUTION IN AFRICA 3
Discusses the critical roles played by women in African revolutionary movements. Why did women join these revolutionary movements? What is the relationship between feminism and revolution?. Crosslisted with HIST439. PREREQ: HIST268. RESTRICTIONS: Majors only, or permission of instructor.

WOMS 440 TOPICS IN INTERPERSONAL COMMUNICATION 3
Topics vary and focus on significant areas of theory and research in interpersonal communication. Topics may include nonverbal communication, lifespan communication and communication in intimate relationships. Crosslisted with COMM440. RESTRICTIONS: May be repeated three times for credit when topics vary.
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tr>
<td>WOMS 441</td>
<td>CONTEMPORARY POLITICS BY COUNTRY</td>
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<td>Study of contemporary politics by country. Course is only taught abroad. May be repeated for credit when topics vary. Crosslisted with POSC441.</td>
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<td>WOMS 442</td>
<td>TOPICS IN ORGANIZATIONAL COMMUNICATION</td>
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<td>Focuses on significant areas of theory and research in organizational communication. Topics may include gender, communication, or interpersonal relations in organizations, such as superior/subordinate relationships. Crosslisted with COMM442. RESTRICTIONS: May be repeated for up to nine credits when topics vary.</td>
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<td>WOMS 444</td>
<td>SEMINAR: WOMEN IN THE ISLAMIC MIDDLE EAST</td>
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<td>Examines the major developments, themes and problems in women's history in the Middle East from the advent of Islam to the present. By tracing women's legal status, sexual morality, family and social life, and female economic and political participation, it seeks to shed light on the process of women's roles in society and to challenge the notion that gender divisions and roles have been static over time. Crosslisted with HIST444. PREREQ: HIST268 RESTRICTIONS: Majors only, or permission of instructor.</td>
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<tr>
<td>WOMS 459</td>
<td>SEXUALITY AND LAW</td>
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<td>Examines the regulation of sexual practices and identities through the law with a specific focus on how the development of legal policy and legal norms at the state and federal level reflects changes in sexual norms as a consequence of social movement activity. Crosslisted with POSC459.</td>
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<td>WOMS 461</td>
<td>TOPICS IN GENDER AND POLITICS</td>
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<td>Topics in gender and politics. Topics will vary. Crosslisted with POSC461.</td>
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<tr>
<td>WOMS 466</td>
<td>INDEPENDENT STUDY</td>
<td>1-6</td>
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<td>WOMS 472</td>
<td>SEMINAR IN MEDIEVAL HISTORY</td>
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<td>Topics may include Europe in the 10th Century, Europe in the 11th Century, and Women in Europe to 1600. Crosslisted with HIST471. PREREQ: HIST268 RESTRICTIONS: Majors only, or permission of instructor.</td>
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<tr>
<td>WOMS 473</td>
<td>GENDER, SEX AND LAW</td>
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<td>Examines the utilization of the law for the purposes of gender equity examining how the courts at the federal and state levels have been used to challenge sex-based discrimination, gender norms, and political inequality. Crosslisted with POSC473.</td>
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<tr>
<td>WOMS 475</td>
<td>SEMINAR IN MODERN EUROPEAN HISTORY</td>
<td>3</td>
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<td>Topics vary and may include The Holocaust, The Cold War, Hitler's Germany, or The Age of Revolution. Crosslisted with HIST475. PREREQ: HIST268 RESTRICTIONS: Majors only, or permission of instructor.</td>
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<tr>
<td>WOMS 480</td>
<td>LITERARY STUDIES SEMINAR</td>
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<td>Intensive capstone seminar employs research presentations as the occasion for students to consolidate skills acquired in 100-, 200-, and 300-level coursework. Content varies by expertise of instructor. Crosslisted with ENGL480. PREREQ: ENGL 110 and six ENGL credits at the 300 level or higher or by instructor consent. RESTRICTIONS: Can be repeated once when topics vary. Only counts toward major if taken as senior (after completing 90 credits). [Non-seniors are not excluded, but a student who completes the course before senior year must re-take the course as a senior for major credit.</td>
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<tr>
<td>WOMS 483</td>
<td>INJURY CONSIDERATIONS FOR THE FEMALE ATHLETE</td>
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<td>There are a variety of gender-specific sport-related injuries that involve the female athlete population. Explore gender-specific anatomical, biological, and physiological mechanisms responsible for such injuries and provide specific case studies for discussion. Crosslisted with KAAP483.</td>
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<tr>
<td>WOMS 484</td>
<td>WOMEN IN SPORTS</td>
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<td>Historical and contemporary perspectives on the female athlete, encompassing biological, psychological, sociological, and legal issues that are gender dependent and culturally unique. Crosslisted with KAAP484.</td>
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<td>WOMS 498</td>
<td>INTERNSHIP IN WOMEN'S STUDIES</td>
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<td>Students work 111 hours per semester in an agency or program associated with women's and/or gender issues. Academic knowledge is applied to actual work situations. Seminar discussions focus on service learning in light of research and theory. May be crosslisted with SGSST498. PREREQ: Any 200-level women's studies course. RESTRICTIONS: Requires permission of instructor. May be repeated once for credit.</td>
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<tr>
<td>WOMS 604</td>
<td>ADVANCED FEMINIST THEORY</td>
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<td>Advanced Feminist Theory provides an in-depth overview of historical and contemporary debates and philosophical concepts informing feminist theory. It will address issues such as the category of women, articulating different feminist paradigms and their implications. It will address key questions that have animated feminist inquiry such as the links between experience, consciousness and politics and theorizing overlapping identities of gender, race, class, sexuality, disability, and nationality.</td>
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<tr>
<td>WOMS 605</td>
<td>FEMINIST RESEARCH METHODS</td>
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<td>This course provides an overview of feminist research methodology providing both a philosophical analysis of feminist research and practical training in methodological approaches. The course texts will address the relationship between knowledge production, the authors producing it, and the knowledge being produced.</td>
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<td>WOMS 606</td>
<td>CRITICAL FEMINIST PEDAGOGY</td>
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<td>Explore the conceptual relationship between critical pedagogy and feminism. The course will use a feminist lens to explore questions involving sex and sexuality, gender, technology, and the possibilities of teaching as praxis involving power, hierarchy, social change, transformation and revolution. 1-credit seminar with an associated 3-credit teaching practicum. Students will lead discussion sessions in conjunction with 200 level Women's Studies classes.</td>
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<td>WOMS 608</td>
<td>CERTIFICATE WRITING REQUIREMENT</td>
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<td>This course requires students to submit an extended piece of scholarly writing in Women and Gender Studies. This may be part of an MA thesis, a Ph.D. dissertation or an essay of publishable quality.</td>
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<tr>
<td>WOMS 610</td>
<td>CRITICAL ISSUES IN FEMINIST SCHOLARSHIP</td>
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<td>Provides a survey introduction to women's studies for graduate students.</td>
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