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**ACCT - Accounting**

**ACCOUNTING Courses**

**ACCT 505. Accounting and Auditing in the Public/Nonprofit Sector. 3 Credits.**
The application of accounting principles to governmental funds and not-for-profit organizations. Emphasis is placed on budgeting and control as well as auditing concerns for such entities. Prerequisites: Graduate standing and a level of competency in accounting at the intermediate level or higher.

**ACCT 511. Financial Auditing. 3 Credits.**
Standards and ethics of the public accounting profession, generally accepted auditing standards, and public reporting are covered, as well as exposure to other types of auditing such as operational and compliance auditing. Prerequisites: Graduate standing and a level of competency at the intermediate accounting level or higher.

**ACCT 521. Taxation. 3 Credits.**
An analysis of federal income tax law and its application to personal and business tax situations. Reconciliation of tax and accounting concepts. Prerequisites: Graduate standing and a level of competency in accounting at the intermediate level or higher.

**ACCT 522. Federal Income Taxation of Individuals and Business Entities. 3 Credits.**
An analysis of federal income tax laws and its application to individuals and business entities. Prerequisites: Graduate standing an a level of competency in tax accounting.

**ACCT 550. International and Advanced Accounting. 3 Credits.**
The study of accounting for international operations and business combinations.

**ACCT 601. Accounting for Managers. 3 Credits.**
A study of the concepts of financial and managerial accounting. Covers the financial reporting process and the development of financial statements for external users while exposing students to internally generated accounting information. The overall objective of the course is to provide students with sufficient knowledge and competency to be intelligent users of accounting information.

**ACCT 623. Operational Assurance Services. 3 Credits.**
Standards, ethics, and practice of operational auditing particularly as it concerns the internal auditing profession, as well as exposure to financial auditing. Prerequisites: ACCT 601 or equivalent.

**ACCT 624. Information Technology Assurance Services. 3 Credits.**
Standards, ethics, and practice of information technology assurance services particularly as it concerns the governance and control of information systems. Prerequisites: ACCT 601 or equivalent.

**ACCT 625. Fraud Examination and Forensic Accounting. 3 Credits.**
Standards, ethics, and practice of fraud examination and forensic accounting particularly as it concerns the accounting profession. Prerequisites: ACCT 601 or equivalent.

**ACCT 626. Financial and Global Accounting. 3 Credits.**
Course covers current financial accounting standards and the reporting problems faced by national and multinational corporations in reporting financial information to external users in a global economy. Discussion of the various techniques for presenting and analyzing financial statements and the ethical issues related to those presentations.

**ACCT 627. Operational Cost Control. 3 Credits.**
Covers cost concepts and analysis in both a manufacturing and service operational environment. Provides an introduction to activity based costing and standard cost systems, methodology for measuring productivity changes and cost of quality and measurement and control of operating performance. Prerequisites: ACCT 601 or equivalent.

**ACCT 630. Financial Statement Analysis. 3 Credits.**
This course covers the analysis and interpretation of financial statements, including the significant accounting issues involved in performing an effective evaluation of a company. Accounting and financial analysis are used to provide a framework for applying the various techniques for analyzing and interpreting financial statements.

**ACCT 631. Advanced Financial Auditing. 3 Credits.**
Advanced concepts associated with the public accounting profession, generally accepted auditing standards, public accounting reporting, and recent developments, such as Sarbanes-Oxley/Public Company Accounting Oversight Board, are emphasized.

**ACCT 640. Professional Ethics and Legal Issues In Accounting. 3 Credits.**
An intensive course covering ethical and legal issues confronted by practicing accountants. The course emphasizes rigorous analysis of complex situations leading to appropriate ethical and legal solutions.

**ACCT 667. Cooperative Education. 1-3 Credits.**
Student participation in a full-time professional work experience. Prerequisites: Permission of the departmental chair in accordance with departmental Cooperative Education policies and approval of Career Management.

**ACCT 668. Accounting Internship. 1-3 Credits.**
The course is a practicum in the profession of accounting where theories, concepts, and financial management techniques are applied in a business environment. Prerequisites: Permission of the departmental chair.

**ACCT 693. Selected Topics in Accounting. 3 Credits.**
Study designed for students who have had one of the required courses waived or for students desiring advanced work in an area of particular interest in accounting. Prerequisites: Permission of the chair of the Department of Accounting and the graduate program director, and a minimum B average in graduate work.

**ACCT 727. Strategic Cost Management. 3 Credits.**
Focuses on advanced costing concepts, current management accounting practices, and analytical techniques employed by controllers in supporting their organization’s strategic planning process.

**ACCT 747. Seminar in Controllership. 3 Credits.**
Prerequisites: ACCT 627 or equivalent. This course is the capstone course for the study of management accounting. It includes a review of management accounting practices and analytical techniques employed by controllers in supporting their organization’s strategic decision-making process.

**ACCT 999. ACCT 999. 1 Credit.**

**AL - Arts And Letters**

**ARTS AND LETTERS Courses**

**AL 595. Topics in Humanities. 1-3 Credits.**
An advanced study of selected topics in humanities.

**AL 596. Topics in Social Studies. 3 Credits.**
An advanced study of selected topics in social studies.

**AL 597. Tutorial Work in Arts and Letters Topics. 3 Credits.**
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: Permission of instructor.

**AL 695. Topics. 1-3 Credits.**
An interdisciplinary study of selected topics in arts and letters.

**AL 795. Topics. 1-3 Credits.**
1-3 credits. Seminar on special interdisciplinary topics for small groups of qualified students. Prerequisites: Advanced graduate standing.

**AL 797. Tutorial Work in Arts and Letters Topics. 1-3 Credits.**
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.
AL 895. Topics. 1-3 Credits.
Seminar on special interdisciplinary topics for small groups of qualified students. Prerequisites: Advanced graduate standing.

AL 897. Tutorial Work in Arts and Letters Topics. 1-3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

**ANTR - Anthropology**

**ANTHROPOLOGY Courses**

ANTR 595. Topics in Anthropology. 1-3 Credits.
A study of selected topics designed for either majors or nonmajors. These courses will appear in the course schedule, and will be more fully described in information distributed to academic advisors. Prerequisites: Approval of the department chair.

ANTR 596. Topics in Anthropology. 1-3 Credits.
A study of selected topics designed for either majors or nonmajors. These courses will appear in the course schedule, and will be more fully described in information distributed to academic advisors. Prerequisites: Approval of the department chair.

ANTR 597. Tutorial Work in Special Topics in Anthropology. 3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: Approval of department chair.

ANTR 598. Tutorial Work in Special Topics in Anthropology. 3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: Approval of department chair.

ANTR 695. Topics in Anthropology. 1-3 Credits.
A study of selected topics for graduate students. The courses will appear in the course schedule, and will be more fully described in information sent to graduate advisors.

ANTR 696. Topics in Anthropology. 1-3 Credits.
A study of selected topics for graduate students. The courses will appear in the course schedule, and will be more fully described in information sent to graduate advisors.

ANTR 697. Tutorial Work in Special Topics in Anthropology. 3 Credits.
Independent reading and study on a topic to be selected under the direction of a member of the graduate faculty. Conferences and papers as appropriate.

ANTR 698. Tutorial Work in Special Topics in Anthropology. 3 Credits.
Independent reading and study on a topic to be selected under the direction of a member of the graduate faculty. Conferences and papers as appropriate.

**ARTH - Art History**

**ART HISTORY Courses**

ARTH 521. Early Medieval Art. 3 Credits.
The art and architecture of the Latin West and Byzantium from the early Christian centuries and the fall of Rome to the Carolingian and Ottoman empire and the fully developed Romanesque of the twelfth century, including manuscripts, metalwork, ivories and enamels.

ARTH 522. Gothic Art and Architecture. 3 Credits.
The painting, sculpture, and architecture of the Gothic period from the mid-twelfth century to the refined and courtly art of the later International Style in France, England, Germany, and Italy as seen in both the monumental and the decorative arts.

ARTH 523. Romanesque Art and Architecture. 3 Credits.
The art and architecture of the period from about 1000 to 1150 in western Europe, including monumental architectural forms, monumental painting and increased book production.

ARTH 534. Romantic Architecture. 3 Credits.
A survey of the aesthetic, technological and social forces that transformed international architecture in the 18th and 19th centuries.

ARTH 535. Modern Architecture. 3 Credits.
An examination of the architecture, planning, and related design of the twentieth and twenty-first centuries around the globe. Special emphasis is placed on the formation of the international style between the world wars and its disintegration in the recent past.

ARTH 538. Fin de Siecle European Art. 3 Credits.
An intensive examination of the major styles, movements, and individuals working in Europe’s avant-garde at the end of the 19th century to the beginning of the first world war.

ARTH 539. Art Between the Wars: 1919-1939. 3 Credits.
A study of the international movements in visual arts and design in the interwar years from Dada to the New York World’s Fair.

ARTH 540. Mid-Century Modern Art (1940-1960). 3 Credits.
An intensive study of the two decades when modernist styles and theories in art, design, and architecture were codified and challenged internationally.

ARTH 560. Art Since 1960. 3 Credits.
Lectures and critical discussion of the development and configurations of the various styles emergent since 1960, both in America and Europe.

ARTH 595. Topics in Art History. 3 Credits.
A study of selected topics in art history to be specified in the class schedule each semester. May be repeated for credit as topics vary.

ARTH 596. Topics in Art History. 3 Credits.
A study of selected topics in art history to be specified in the class schedule each semester. May be repeated for credit as topics vary.

ARTH 597. Tutorial Work in Art History. 3 Credits.
Independent research on a topic to be selected under the guidance of the instructor.

ARTH 598. Tutorial Work in Art History. 3 Credits.
Independent research on a topic to be selected under the guidance of the instructor.

ARTH 600. Graduate Seminar: Art Criticism. 3 Credits.
An examination of critical methodologies as they relate to the visual arts, with readings drawn from the contemporary scene and the recent past.

ARTH 610. Visual Arts Across Media and Time. 3 Credits.
This course is an introduction to emerging creative, curricular, and research activities in contemporary art, design, art education, and art history. Through lectures, readings, discussion, critical analysis, and creative work, students will engage with ideas and artwork across the broad spectrum of contemporary practice.

ARTH 668. Internship. 3 Credits.
A structured work experience in a museum, gallery, archive, or related environment, either with or without remuneration. Criteria for evaluation will be determined by work supervisor and cooperating faculty advisor. May be repeated for credit. Available for pass/fail grading only.

ARTH 695. Topics in Art History. 1-3 Credits.
Topics to be specified in the class schedule. Intensive critical investigations of specialized areas in art history. May be repeated for credit as topics vary.

ARTH 697. Tutorial in Art History. 1-3 Credits.
Independent research on a topic to be selected under the guidance of the instructor.

**ARTS - Art, Studio**

**ART, STUDIO Courses**

ARTS 512. Photo Seminar 1. 3 Credits.
The first of a two-semester sequence of concentrated individual work. Students will identify a topic and create a complete body of work. Lectures, readings, discussion, critique, and field trips to develop the articulation of ideas and the clarification of purpose.
ARTS 513. Photo Seminar 2. 3 Credits.
This is the second in a two-semester sequence of concentrated individual work. Through readings, discussion, critiques, field trips, and intense individual work, students will compile a body of work realizing their personal vision and articulate their ideas through the crafting of an artist statement.

ARTS 531. Drawing Studio. 3 Credits.
Further concentration on conceptual content and drawing skills, development of individual body of work exploring preferred concepts, subject matter, techniques, and media. May be repeated for credit.

ARTS 532. Figure Drawing Anatomy. 3 Credits.
A study of visually important aspects of the structural, skeletal and muscular systems of the body. Anatomical study will be related to drawing from the live model.

ARTS 533. Figure Drawing/Composition. 3 Credits.
This course places the emphasis on advanced composition using the figure as the central theme. The figure’s expressive potential, along with a study of historical responses to figure drawing, will be examined in depth. Prerequisites: ARTS 532.

ARTS 542. Painting Studio. 3 Credits.
Independent work in painting with focus on developing content. Frequent critiques. May be taken for repeat credit.

ARTS 550. Printmaking Studio. 3 Credits.
Experimental work in selected print media.

ARTS 555. Letterpress Printmaking. 3 Credits.
A visual and literary investigation of language and wordplay using foundry and wood type and a Vandercook SP-20 proofing press. Projects include expressive printed impressions of personal poetry and song lyric, political rant, and broadsides for entertainment or proselytizing. A theme group project such as a folio or a bound book, is usually assigned.

ARTS 561. Sculpture Studio. 3 Credits.
Experimental work reflecting individual initiative and attitude.

ARTS 563. Advanced Ceramics. 3 Credits.
An advanced course in the science and art of ceramics. Students will engage in guided independent research, developing their own direction by investigating clay bodies, glazes, firing methods and contemporary ceramic art.

ARTS 569. Assemblage. 3 Credits.
Assemblage combines elements of various art and non-art media and materials. Lectures will be comprised of presentations about relevant artists, gallery and studio visits, and critiques. Studio time allows students to explore personal directions in the medium.

ARTS 573. The Book. 3 Credits.
The book as a work of art. Lecture will explore historical and technical aspects of book design and production. Studio work will be devoted to the production of a series of books involving page design, paper selection, printing and binding.

ARTS 575. Editorial Design. 3 Credits.
An examination of conceptual and design strategies associated with the layout of multi-page publication. Emphasis is placed on organizational and hierarchical systems, continuity and pacing, and the integration of image and type.

ARTS 581. Crafts III: Fibers. 3 Credits.
Advanced work in pattern drafting, loom techniques, off-loom weaving and fabric painting.

ARTS 591. Crafts III: Metalsmithing and Jewelry. 3 Credits.
Further exploration in casting and soldering with concentration in the metal-forming techniques of raising and forging. Additional introduction to the techniques of working in steel.

ARTS 595. Topics in Studio Art. 3 Credits.
The advanced study of selected topics designed to permit small groups of qualified students to work on studio projects of mutual interest. Prerequisites: permission of the instructor.

ARTS 597. Tutorial Work in Special Studio Topics. 3 Credits.
Independent investigation of a subject to be selected under the advisement of the instructor.

ARTS 610. Visual Arts Across Media and Time. 3 Credits.
This course is an introduction to and overview of emerging creative, curricular, and research activities in contemporary art, design, art education, and art history. Through lectures, readings, discussions, critical analysis, and creative work, students will engage with ideas and artwork across the broad spectrum of contemporary art education, production, and investigation.

ARTS 668. Internship. 3 Credits.
A structured work experience involving aspects of art, design or craft; film or video making; and/or museum/gallery work.

ARTS 695. Graduate Seminar: Special Topics in Contemporary Art. 3 Credits.
Topics to be specified in the class schedule. Intensive critical investigations of selected aspects of the visual arts which focus on the role of the artist in contemporary urban society. May be repeated for credit as topics vary.

ARTS 697. Graduate Studio. 3-6 Credits.
Supervised individual inquiry in specific studio projects relating to the areas of major interest. Prerequisites: permission of graduate program director required.

ARTS 698. Graduate Studio. 3-6 Credits.
Supervised individual inquiry in specific studio projects relating to the areas of major interest. Prerequisites: permission of graduate program director required.

ARTS 700. Directed Field Experience. 3-6 Credits.
Intern experiences in museums, community centers and arts programs, teaching assistantships, special apprenticeships, and field projects under the supervision of graduate faculty. Required of all M.F.A. candidates. Prerequisites: permission of graduate program director required.

ARTS 701. Thesis Exhibition. 3 Credits.
Required of M.F.A. candidates. Course requirements to be determined by the student’s advisory committee. Final grade to be determined by the student’s thesis review committee. Prerequisites: permission of graduate program director required.

ARTS 702. Documentation. 3 Credits.
Studio work in preparation for required graduate exhibition. Public exhibition to be approved by the student’s advisory committee and must be accompanied by final review. Documentation may be required. Required of all M.A. and M.F.A. candidates. Final grade to be determined by the student’s thesis review committee. Prerequisites: permission of graduate program director required.

ARTS 797. Graduate Studio. 3-6 Credits.
Supervised individual inquiry in specific studio projects relating to areas of major interest. Individual studio spaces will be assigned. Prerequisites: permission of graduate program director required.

ARTS 798. Graduate Studio. 3-6 Credits.
Supervised individual inquiry in specific studio projects relating to areas of major interest. Individual studio spaces will be assigned. Prerequisites: permission of graduate program director required.

ARTS 999. Audit Registration. 1 Credit.
A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all master’s students are required to be registered for at least one graduate credit each term until the degree is complete.
ASIA - Asian Studies

ASIAN STUDIES Courses

ASIA 595. Topics in Asian Studies. 3 Credits.
This course is designed for small groups of qualified students to conduct advanced study of selected topics on Asian Studies, topics which may not be taught in regularly scheduled classes. The description of the course for each offering will appear in the course schedule that is distributed to each advisor. Prerequisites: Appropriate survey source or permission of the instructor.

BIMD - Biomedical Sciences

BIOMEDICAL SCIENCES Courses

BIMD 702. Medical Molecular and Cellular Biology. 4 Credits.
BIMD 703. Medical Biochemistry. 4 Credits.
BIMD 706. Pharmacology. 5 Credits.
BIMD 708. Medical Neuroscience. 5 Credits.
BIMD 715. Human Physiology I. 2 Credits.
BIMD 716. Human Physiology II. 3 Credits.
BIMD 725. Neurocytology and Ultrastructure of the Nervous System. 2 Credits.
BIMD 726. Medical Histology. 5 Credits.
BIMD 739. Topics Biochemical and Molecular Biology. 1 Credit.
BIMD 741. Introduction to Research Literature. 1 Credit.
BIMD 743. Foundations of Molecular Biology. 3 Credits.
BIMD 745. Molecular Cytogenetics. 4 Credits.
BIMD 746. History of Genetics. 3 Credits.
BIMD 747. Mammalian Reproduction. 3 Credits.
BIMD 748. Concepts in Cellular Biology and Physiology. 3 Credits.
BIMD 751. Neuroendocrinology. 1 Credit.
BIMD 753. Special Topics in Genetics. 1 Credit.
BIMD 756. Advanced Cardiovascular Sciences. 3 Credits.
BIMD 757. Current Topics in Cardiovascular Science. 1 Credit.
BIMD 765. Neuropharmacology I. 3 Credits.
BIMD 771. Advanced Endocrinology. 3 Credits.
BIMD 772. Biochemical and Physiologic Bases of Nutrition. 3 Credits.
BIMD 773. Responsible Conduct in Science. 1 Credit.
BIMD 774. Topics in Growth Factor Physiology. 1 Credit.
BIMD 801. Medical Gross Anatomy. 6 Credits.
BIMD 802. Medical Molecular and Cellular Biology. 4 Credits.
BIMD 803. Medical Biochemistry. 4 Credits.
BIMD 804. Medical Microbiology and Immunology. 7 Credits.
BIMD 805. Topics in Genomics and Bioinformatics. 1 Credit.
BIMD 806. Pharmacology. 5 Credits.
BIMD 808. Medical Neuroscience. 5 Credits.
BIMD 809. Medical Microbiology and Bacteriology. 2 Credits.
BIMD 810. Medical Microbiology and Virology. 2 Credits.
BIMD 811. Medical Microbiology, Mycology, and Parasitology. 1 Credit.
BIMD 812. Medical Microbiology and Immunology. 2 Credits.
BIMD 814. Biomedical Sciences Laboratory. 2 Credits.
BIMD 815. Human Physiology I. 2 Credits.
BIMD 816. Human Physiology II. 3 Credits.

BIOL - Biological Sciences

BIOLOGICAL SCIENCES Courses

BIOL 500. Flowering Plant Families. 5 Credits.
An evolutionary survey of flowering plant families; emphasis on recognition and identification of plant families and the principles and methodologies that define them; and evolution of biodiversity. Focus on local representatives and large families in the field and laboratory. An activity oriented, hands-on course.

BIOL 501. Entomology. 4 Credits.
A comprehensive survey of the insects, including taxonomy, morphology, physiology, reproductive and developmental biology, and ecology. Research techniques in entomology will be learned through both field and laboratory work. Prerequisites: BIOL 291 and BIOL 292.

BIOL 503. Medical Microbiology. 3 Credits.
This course integrates the disciplines of microbiology, immunology, and biochemistry with the pathophysiology of infections and the appropriate pharmacology in a problem-based learning setting. Students will learn the fundamental concepts and terminologies of infectious diseases. The material will be case studies in small group tutorials and emphasize independent learning. Prerequisites: BIOL 115N or BIOL 126N, BIOL 116N or BIOL 127N, BIOL 250, BIOL 315, CHEM 441, or instructor approval.
BIOL 504. Conservation Biology. 5 Credits.
The application of fundamental biological principles to the preservation of biodiversity, including the role of ecological and evolutionary theory to the preservation of biotas on a regional and global basis. Lectures will cover modern approaches to conservation biology, including conservation ethics and management issues. Laboratories will include discussion of case studies, introduction to software applicable to conservation biology, presentations by regional conservation practitioners, and visits to relevant field sites.

BIOL 508. Introduction to Pharmacology. 4 Credits.
This is a general introductory course in pharmacology dealing with chemistry, general properties and pharmacological effects on various physiological systems, therapeutic usefulness and toxicities of drugs. The course is designed to prepare upper-level undergraduate and graduate students for more advanced courses in pharmacology.

BIOL 509. Immunology. 3 Credits.
A comprehensive study of the phenomena of immune resistance, the cells and tissues involved in immune responses, and the consequences of immunization. Prerequisites: permission of the instructor.

BIOL 512. Plant Physiology. 4 Credits.
A study of the physiological processes which occur in plants. A laboratory and greenhouse oriented course stressing plant nutrients, cell metabolism-respiration, photosynthesis, nitrogen metabolism, and plant hormones. Prerequisite: BIOL 292.

BIOL 515. Marine Ecology. 3 Credits.
An introduction to ecological processes in the marine environment, with an emphasis on coastal ecosystems. The course covers synthetic topics as well as the ecology of specific marine habitats. Prerequisites: BIOL 115N, BIOL 116N, BIOL 331, and previous course in ecology. Pre- or corequisite: When offered during the fall semester, BIOL 542 is a corequisite.

BIOL 516. Clinical Immunology. 3 Credits.
A description of common immunological problems seen in the clinic. Prerequisites: BIOL 509.

BIOL 519. Wetland Plants. 5 Credits.
A field-oriented course on the identification of plants used to delineate wetlands including ecology, variability, and distribution. Prerequisites: BIOL 291 and BIOL 308.

BIOL 520. Ichthyology. 5 Credits.
The biology of marine and freshwater fishes including morphology, physiology, evolution, distribution, ecology, and reproduction. Prerequisite: BIOL 292 and junior standing.

BIOL 522. Field Studies in Ornithology. 4 Credits.
A combined lecture and field study of birds with emphasis on identification, behavior, and field methods. Extensive field trips, including at least one weekend, are taken. Prerequisites: BIOL 291, BIOL 292 or permission of the instructor.

BIOL 523. Cellular and Molecular Biology. 3 Credits.
The molecular organization of eucaryotic cells is presented along with cell evolution, molecular genetics, the internal organization of the cell and the behavior of cells in multicellular organisms. Prerequisites: course background in cell biology and genetics or permission of the instructor.

BIOL 524. Comparative Animal Physiology. 5 Credits.
An introduction to the basic mechanisms by which different animals function. How organisms acquire and use energy, regulate their internal environment, circulate and exchange gases and wastes, receive and conduct information about their environment, and move and use muscles will be some of the topics covered. Emphasis will be on how organisms make changes in these basic mechanisms to deal with different environmental conditions. Prerequisite: BIOL 291.

BIOL 526. Histology. 5 Credits.
The structure and function of cells, tissues and organs at both the light microscopic and ultrastructural levels.

BIOL 530. Microbial Pathogenesis. 3 Credits.
Examination of bacterium-host interactions with an emphasis on how bacteria cause disease, particularly the means by which the bacterium is able to circumvent host defense mechanisms Prerequisites: microbiology course.

BIOL 535. Marine Conservation Biology. 3 Credits.
This highly interdisciplinary science of conserving marine biodiversity will be taught through a review of old and new literature. This will include its history, marine ecology related to conservation biology, threats to marine biodiversity, assessment of extinction risk, conservation challenges of marine habitats and regions, and methods for conserving marine biodiversity.

BIOL 536. Infectious Disease Epidemiology. 3 Credits.
This lecture/lab course will focus on concepts related to the spread and control of infectious diseases. The lectures will focus on concepts while the labs will provide quantitative skills essential to the study of infectious diseases.

BIOL 538. Dendrology. 4 Credits.
The study of trees and shrubs, their identification, ecology, structure and anatomy, lore, and uses. A field-oriented course. A research project including a written paper and presentation is required. Prerequisite: BIOL 308 or equivalent.

BIOL 541. Animal Behavior. 5 Credits.
Animal behavior with special attention to its evolution and ecological significance. Field and laboratory activities will emphasize observational and experimental techniques used to study behavior. Prerequisite: BIOL 291 and BIOL 292 or permission of instructor.

BIOL 542. Marine Ecology Laboratory. 2 Credits.
An intensive study abroad field course in which students gain practical experience with research techniques common to coastal marine ecology, and become familiar with the organisms and ecological conditions present in the various marine habitats visited by the class. A field trip of several days is required. Pre- or corequisite: When offered during the fall semester, BIOL 515 is a corequisite.

BIOL 544. Field Studies in Marine Biology. 5 Credits.
An intensive study abroad field course offered during the summer at a foreign marine laboratory where students will be engaged in lectures and field studies of coastal marine environments. Check with the Director of the Marine Biology Concentration Program for details.

BIOL 545. Community Ecology. 3 Credits.
The goal of this course is to introduce and evaluate both classical and emerging paradigms in community ecology. This will be achieved by examining those processes (biotic and abiotic) that structure ecological communities, and by exposing students to quantitative and theoretical aspects of these paradigms. Prerequisite: BIOL 291 or equivalent.

BIOL 546. Comparative Biomechanics. 3 Credits.
The principles of fluid and solid mechanics will be applied to a variety of plant and animal systems to understand how organisms deal with the immediate physical world and its accompanying constraints. A diverse range of topics will be covered, including aerial flight in insects, wind resistance in trees, jet propulsion in squid, flow within blood vessels, forces on intertidal organisms, viscoelasticity in biological materials, and energy storage during terrestrial movement. Prerequisites: BIOL 293; PHYS 111N and PHYS 112N recommended.

BIOL 550. Principles of Plant Ecology. 4 Credits.
Course covers the general theoretical concepts in plant ecology with statistical methods. The structure, development, processes, and history of plant communities are studied. Laboratories involve extensive fieldwork. A weekend field trip is required. Prerequisite: BIOL 291 and senior standing.

BIOL 554. Parasitology. 4 Credits.
A basic course which treats parasitism as one of several biological interactions. The principles discussed are structural and physiological adaptations to parasitism, host specificity, immunity, parasitic life cycles, and evolution of parasitism. Representative species are examined in the laboratory.
BIOL 556. Population Genetics. 3 Credits.
An introduction to the principles of population genetics and addresses topics such as inheritance, genetic variation, fitness, natural selection, mutation, genetic drift, gene expression, and single- and multi-locus models of different types of selection. Human disease is addressed. Students will write a mock-grant proposal. Prerequisite: BIOL 303.

BIOL 557. General Virology. 3 Credits.
A basic course covering the history of virology, viral taxonomy, genetics, and the molecular biology and host responses to the major mammalian virus groups. Examples of recent impacts of viruses on human health such as influenza pandemics will also be covered.

BIOL 560. Frontiers in Nanoscience and Nanotechnology. 1 Credit.
Review of the structure, synthesis and properties of key nano-materials and their impact on living systems.

BIOL 561. Human Cadaver Dissection. 4 Credits.
Students will dissect a human cadaver and learn all major structures. All exams will be practical tag-tests using human tissue. The major emphasis will be on head, neck, trunk, and joints with some clinical application to injuries and surgery.

BIOL 574. Mushrooms. 4 Credits.
Lecture 2 hours; laboratory 6 hours; 4 credits. The identification, classification ecology, culture, and uses of mushrooms and other fleshy fungi. A field oriented course.

BIOL 578. Microbial Ecology. 3 Credits.
Study of the interactions between microorganisms, particularly bacteria, and their environment. Emphasis is placed on nutrient cycling and the influence of microbes on global mineral dynamics. The effects of physical and chemical factors on distribution and activity of microbes in their environments and applications of these interactions are studied (biotechnology). Prerequisites: a general microbiology course.

BIOL 579. Microbial Ecology Laboratory. 1 Credit.
A laboratory for measurement of microbial numbers and activity in natural environments. Pre- or corequisite: BIOL 578.

BIOL 580. Advanced Human Physiology Laboratory. 2 Credits.
A study of the cardiovascular, respiratory, nervous and digestive systems using mammals.

BIOL 581. Forensic and Medical Entomology. 5 Credits.
A comprehensive survey of insects important to legal and medical fields, including their biology, use in criminal investigations and roles as disease vectors. Laboratories will include exercises in both field and bench laboratory activities. Prerequisites: BIOL 115N, BIOL 116N, BIOL 291, and BIOL 292.

BIOL 590. Advanced Human Physiology. 4 Credits.
All major physiological systems with emphasis on normal physiology. Some clinical applications made but not stressed.

BIOL 596. Topics in Biology. 3 Credits.
Prerequisites: Permission of the instructor. A specially designed course concerning specific topics in the biological, environmental, or allied health fields.

BIOL 598. Independent Study in Biology. 1-3 Credits.
Prerequisites: permission of the CDA and permission of instructor. Supervised (non-lab/field) project selected to suit the needs of the individual student. Requires completion of formal scientific paper documented with appropriate primary technical literature (see CDA for details). Unstructured course.

BIOL 609. Special Readings in Biology. 3 Credits.
Reading and discussion course designed to explore a field of specific interest.

BIOL 620. Biometry. 4 Credits.
A first course, or a refresher course, in statistical methods and experimental design for graduate students in biology and the natural sciences. The focus is on application and hypothesis testing with examples drawn from the field of biology. The course requires a significant amount of work outside the classroom on homework exercises and an independent project. Prerequisites: STAT 130M.

BIOL 661. Topics in Biology. 1-3 Credits.
1-3 credits. Supervised projects and practica selected to meet the specific objectives of the student.

BIOL 669. Internship in Biology. 3 Credits.
3 credits. With approval of Advisory Committee.

BIOL 671. Molecular and Immunological Techniques. 4 Credits.
Lecture, 1 hour; lab, 6 hours. 4 credits. A lab-intensive course emphasizing current methods in molecular biology.

BIOL 672. Responsible Conduct in Research. 2 Credits.
2 cr. Required of all graduate students admitted to Biology programs. The course will introduce students to the responsible conduct of science and scientific research.

BIOL 695. Topics in Biology. 1-3 Credits.
1-3 credits. A specially designed course concerning specific topics in the biological, environmental or allied health fields.

BIOL 698. Research in Biology. 1-3 Credits.

BIOL 699. Thesis. 3 Credits.
3 credits. This course is selected with the recommendation of the faculty advisor.

BIOL 700. Cardiovascular Physiology. 4 Credits.
4 credits. This physiology course will focus solely on Cardiovascular Physiology. Lectures will focus on basic and advance cardiovascular principles. The laboratory will focus on the use of current cardiovascular research.

BIOL 702. Biomedical Sciences Journal Club. 1 Credit.
1 credit. Review and discussion of current papers in the areas of biomedical sciences. Student presentation, discussions and readings in this field required.

BIOL 705. Advanced Microbiology. 4 Credits.
Lecture 2 hours; laboratory 4 hours; 4 credits. Prerequisite: A microbiology course. Investigate microbiology from historical perspectives to modern molecular microbiology; ecological and biomedical components; bacteria and viruses. Laboratory will involve designing experiments conducting and evaluating results.

BIOL 707. Ecosystem Ecology. 5 Credits.
Ecoligical principles at ecosystem level of biological organization. Discussion of energy flow, nutrient cycling, ecosystem stability and ecosystem modeling. Laboratory involves field trips and methods of measuring ecosystem parameters. Prerequisites: a general ecology course.

BIOL 708. Biological Sciences Seminar. 1 Credit.
A graduate seminar course in the ecological sciences. The format of the course depends on the faculty running the seminar, but most seminars involve student-led discussions on current research articles.

BIOL 712. Biological Microscopy. 4 Credits.
Prerequisites: permission of the instructor. Lectures will cover theory and concepts of specimen preparation and operation of various microscopes used in the biological sciences. The laboratory experience will include specimen preparation to viewing.

BIOL 714. Biomedical Sciences Laboratory. 2 Credits.
2 credits. Prerequisite: approval of the program director. Three laboratory rotations (6 credits) are required by the curriculum.

BIOL 715. Biomedical Sciences Laboratory. 2 Credits.
BIOL 716. Endocrinology. 5 Credits.
Lecture 3 hours; laboratory 4 hours; 5 credits. Prerequisites: BIOL 312 or permission of the instructor. The biochemical integration of hormones and related agents on vertebrate physiology with emphasis on human endocrinology. Recent literature will be stressed.

BIOL 720. Systematic Ichthyology. 3 Credits.
A systematic survey of fishes emphasizing life history, anatomy, identification and classification. Prerequisites: BIOL 520.

BIOL 724. Neuromuscular Physiology. 3 Credits.
Lecture, 3 hours; 3 credits. This course will provide a comprehensive discussion of the physiological and chemical properties of nerve and muscle cells.

BIOL 725. Neuromuscular Physiology. 3 Credits.
Lecture, 3 hours. 3 credits. This course will provide a comprehensive discussion of the physiological and chemical properties of nerve and muscle cells.

BIOL 730. Emerging Infectious Diseases. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: A microbiology course. Discussion on current studies into new and reemerging infectious diseases with an examination of the infectious agent and factors involved in disease emergence, prevention and elimination.

BIOL 731. Systematics and Speciation. 3 Credits.
Principles of systematic biology and discussion of speciation theory, with emphasis on generation, analysis, and interpretation of taxonomic data and application of these data to a better understanding of classification and speciation processes. Modern theories of evolutionary biology and phylogenetics will be stressed. A research paper is required.

BIOL 732. GIS in the Life Sciences. 3 Credits.
This course is designed to introduce students to geographic information systems through examples and applications in the life sciences.

BIOL 745. Advanced Immunology. 3 Credits.
Lecture 3 hours; 3 credits. Current concepts in cellular and molecular immunology and host defense based on critical review of the primary literature.

BIOL 749. Biogeography. 3 Credits.
Emphasis on historical biogeography, utilizing both dispersal and vicariance models for explanations of the geographic distribution of organisms. Ecological explanations are also considered. Useful techniques for biogeographic analyses, such as comparison of area cladograms are discussed at length.

BIOL 750. Marine Benthic Ecology. 4 Credits.
Application of ecological principles at the community level to marine benthic environments. Discussion of community structure, animal-sediment relationships, roles of benthic communities in marine ecosystems. Prerequisites: BIOL 415 or equivalent.

BIOL 751. Advanced Practices in Ethnobotany. 3 Credits.
The major objective of this course is modern methods used to study plants influencing human culture. Objectives include plant systematics and applications of DNA bar coding and fingerprinting; phytochemical techniques in drug discovery and food supplements; intellectual property rights; ecological methods for sustainable harvesting of natural products; the ethnobotanical interview and questionnaire development; methods for studying crop origins, history, and development; archeobotany; mining historical data; and importance of identification, vouching, efficacy, and conservation. This course provides a survey of interdisciplinary methodologies used in modern ethnobotanical research. A multi-day field trip is a required component.

BIOL 754. Phylogeny and Molecular Lecture and Laboratory. 5 Credits.
This course is intended to be an introduction to the processes and procedures used to reconstruct the evolutionary history of living organisms. Topics include project planning, sampling strategies, molecular techniques, and analytical and tree-building programs used to infer phylogeny. Lab provides computer experience in multiple phylogenetic software packages.

BIOL 755. Molecular Genetics. 3 Credits.
Current molecular understanding of genetic processes will be reviewed. Applications to areas such as development and evolution will also be covered. Prerequisites: Graduate standing and BIOL 523.

BIOL 756. Phylogeny and Molecular Systematics. 5 Credits.
This course is intended to be an introduction to the processes and procedures used to reconstruct the evolutionary history of living organisms. Topics include project planning, sampling strategies, molecular techniques, and analytical and tree-building programs used to infer phylogeny. Lab provides computer experience in multiple phylogenetic software packages.

BIOL 758. Molecular Ecology. 4 Credits.
Scientist are increasingly using molecular methods to help them address fundamental questions in the population ecology and evolution of biological species. This class will introduce graduate students to the basic concepts and methods in molecular evolution, phylogenetics and methods into their research. Theory and concepts from lecture will be illustrated through reading and discussion of current scientific literature. Students will also directly apply the course material to a class project investigating population structure of marine species from the tropical Indo-Pacific, for which they will be trained in methods of DNA extraction, PCR and sequencing. They will present their results orally in a mini-symposium at the end of the course.

BIOL 759. Foundations and Principles in Ecology. 3 Credits.
A survey of the seminal ideas and perspectives in historical and contemporary ecology. The course is designed to provide a broad overview of the important theoretical and conceptual paradigms in ecology.

BIOL 770. Advanced Study in Biology. 3 Credits.
Tutorial; 3 credits. Under the guidance of members of the graduate faculty and with the approval of the program track coordinator, the student will carry out in-depth studies of selected topics relevant to the area of specialization. Extensive surveys and analyses of the literature. Written reviews, comprehensive and synoptic, and oral presentations are required of each student.

BIOL 771. Vector-Borne Diseases. 3 Credits.
Lecture, 3 hours; 3 credits. Study of the role of insects, ticks and other invertebrates in the transmission of disease. Different areas of disease transmission will be examined, including physiological and biochemical aspects of microbial survival in the vector and transmission to vertebrate hosts, as well as ecological aspects.

BIOL 772. Modeling and Simulation in the Life Sciences. 4 Credits.
Course is designed to introduce students to modeling and simulation techniques using examples and applications in the life sciences.

BIOL 775. Grant Writing for the Life Sciences. 3 Credits.
Provides students with the skills to write competitive grant proposals to both private and federal funding sources (emphasis on NIH and NSF). Students will learn how to find the most appropriate funding mechanisms and how to position themselves to be competitive. Different grant writing formats will be illustrated through proposal development projects.

BIOL 789. Gross Anatomy. 6 Credits.
An intense study of all systems from a regional approach. Extensive dissections required in lab. Clinical applications utilized.

BIOL 795. Special Topics in Biology. 1-4 Credits.
1-4 credits. Prerequisite: permission of the instructor.

BIOL 800. Cardiovascular Physiology. 4 Credits.
4 credits. This physiology course will focus solely on Cardiovascular Physiology. Lectures will focus on basic and advance cardiovascular principles. The laboratory will focus on the use of current cardiovascular research.

BIOL 802. Biomedical Sciences Journal Club. 1 Credit.
1 credit. Review and discussion of current papers in the areas of biomedical sciences. Student presentation, discussions and readings in this field required.
BIOL 805. Advanced Microbiology. 4 Credits.
Lecture 2 hours; laboratory 4 hours; 4 credits. Prerequisite: A microbiology course. Investigate microbiology from historical perspectives to modern molecular microbiology; ecological and biomedical components; bacteria and viruses. Laboratory will involve designing experiments conducting and evaluating results.

BIOL 807. Ecosystem Ecology. 5 Credits.
Ecological principles at ecosystem level of biological organization. Discussion of energy flow, nutrient cycling, ecosystem stability and ecosystem modeling. Laboratory involves field trips and methods of measuring ecosystem parameters. Prerequisites: a general ecology course.

BIOL 808. Ecological Sciences Seminar. 1 Credit.
A graduate seminar course in the ecological sciences. The format of the course depends on the faculty running the seminar, but most seminars involve student-led discussions on current research articles.

BIOL 812. Biological Microscopy. 4 Credits.
Prerequisites: permission of the instructor. Lectures will cover theory and concepts of specimen preparation and operation of various microscopes used in the biological sciences. The laboratory experience will include specimen preparation to viewing.

BIOL 814. Biomedical Sciences Laboratory. 2 Credits.
2 credits. Prerequisite: approval of the program director. Three laboratory rotations (6 credits) are required by the curriculum.

BIOL 816. Endocrinology. 5 Credits.
Lecture 3 hours; laboratory 4 hours; 5 credits. Prerequisites: BIOL 312 or permission of the instructor. The biochemical integration of hormones and related agents on vertebrate physiology with emphasis on human endocrinology. Recent literature will be stressed.

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Lecture, 3 hours; 3 credits. This course will provide a comprehensive discussion of the physiological and chemical properties of nerve and muscle cells.

BIOL 825. Neuromuscular Physiology. 3 Credits.
Lecture, 3 hours. 3 credits. This course will provide a comprehensive discussion of the physiological and chemical properties of nerve and muscle cells.

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Lecture 3 hours; 3 credits. Current concepts in cellular and molecular immunology and host defense based on critical review of the primary literature.

BIOL 849. Biogeography. 3 Credits.
Emphasis on historical biogeography, utilizing both dispersal and vicariance models for explanations of the geographic distribution of organisms. Ecological explanations are also considered. Useful techniques for biogeographic analyses, such as comparison of area cladograms are discussed at length.

BIOL 850. Marine Benthic Ecology. 4 Credits.
Application of ecological principles at the community level to marine benthic environments. Discussion of community structure, animal-sediment relationships, roles of benthic communities in marine ecosystems. Prerequisites: BIOL 415 or equivalent.

BIOL 851. Advanced Practices in Ethnobotany. 3 Credits.
The major objective of this course is modern methods used to study plants influencing human culture. Objectives include plant systematics and applications of DNA bar coding and fingerprinting; phytochemical techniques in drug discovery and food supplements; intellectual property rights; ecological methods for sustainable harvesting of natural products; the ethnobotanical interview and questionnaire development; methods for studying crop origins, history, and development; archeobotany; mining historical data; and importance of identification, vouching, efficacy, and conservation. This course provides a survey of interdisciplinary methodologies used in modern ethnobotanical research. A multi-day field trip is a required component.

BIOL 854. Phylogeny and Molecular Lecture and Laboratory. 5 Credits.
This course is intended to be an introduction to the processes and procedures used to reconstruct the evolutionary history of living organisms. Topics include project planning, sampling strategies, molecular techniques, and analytical and tree-building programs used to infer phylogeny. Lab provides computer experience in multiple phylogenetic software packages.

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Current molecular understanding of genetic processes will be reviewed. Applications to areas such as development and evolution will also be covered. Prerequisites: graduate standing and BIOL 523.

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Scientist are increasingly using molecular methods to help them address fundamental questions in the population ecology and evolution of biological species. This class will introduce graduate students to the basic concepts and methods in molecular evolution, phylogenetics and methods into their research. Theory and concepts from lecture will be illustrated through reading and discussion of current scientific literature. Students will also directly apply the course material to a class project investigating population structure of marine species from the tropical Indo-Pacific, for which they will be trained in methods of DNA extraction, PCR and sequencing. They will present their results orally in a mini-symposium at the end of the course.

BIOL 859. Foundations and Principles in Ecology. 3 Credits.
A survey of the seminal ideas and perspectives in historical and contemporary ecology. The course is designed to provide a broad overview of the important theoretical and conceptual paradigms in ecology.

BIOL 861. Ecological Sciences Internship. 3-6 Credits.
Internship experience. Prerequisites: approval of advisory committee.

BIOL 871. Vector-Borne Diseases. 3 Credits.
Lecture, 3 hours; 3 credits. Study of the role of insects, ticks and other invertebrates in the transmission of disease. Different areas of disease transmission will be examined, including physiological and biochemical aspects of microbial survival in the vector and transmission to vertebrate hosts, as well as ecological aspects.

BIOL 872. Modeling and Simulation in Life Sciences. 4 Credits.
Course is designed to introduce students to modeling and simulation techniques using examples and applications in the life sciences.
**BIOL 875. Grant Writing for the Life Sciences. 3 Credits.**
Provides students with the skills to write competitive grant proposals to both private and federal funding sources (emphasis on NIH and NSF). Students will learn how to find the most appropriate funding mechanisms and how to position themselves to be competitive. Different grant writing formats will be illustrated through proposal development projects.

**BIOL 880. Advanced Study in Biology. 3 Credits.**
Tutorial; 3 credits. Under the guidance of members of the graduate faculty and with the approval of the program track coordinator, the student will carry out in-depth studies of selected topics relevant to the area of specialization. Extensive surveys and analyses of the literature. Written reviews, comprehensive and synoptic, and oral presentations are required of each student.

**BIOL 889. Gross Anatomy. 6 Credits.**
An intense study of all systems from a regional approach. Extensive dissections required in lab. Clinical applications utilized. Prerequisites: BIOL 250 and BIOL 251 or equivalent.

**BIOL 895. Special Topics in Biology. 1-4 Credits.**
1-4 credits. Prerequisite: permission of the instructor.

**BIOL 898. Research in Biology. 1-6 Credits.**

**BIOL 899. Dissertation. 1-6 Credits.**

**BIOL 999. Biological Sciences 999. 1 Credit.**
1 credit. A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

**BME - Biomedical Engineering**

**BIOMEDICAL ENGINEERING Courses**

**BME 501. Biomedical Engineering Design and Innovation. 3 Credits.**
Lecture, 3 hours; 3 credits. The course will expose students to the design strategies, techniques, tools, and protocols commonly encountered in medical technology innovation. Needs identification, concept generation, technology development, market analysis, regulation and integration will be discussed.

**BME 502. Biomedical Engineering Principles. 3 Credits.**
Lecture, 3 hours. 3 credits. The course exposes students to principles used in biomedical engineering. Areas discussed include modeling of physiological processes, biomedical signal acquisition and processing, biomaterials, rehabilitation engineering, and ethical principles in biomedical engineering.

**BME 505. Biomechanics. 3 Credits.**
This course will discuss methods of quantitative analysis of biological forces and materials that produce human movement. Kinematics, force analysis of joints, the measurement of mechanical properties and the development and understanding of models of the biological materials incorporating structure and composition will be emphasized. Prerequisite: MEDT 505.

**BME 508. Microfluidics. 3 Credits.**
This course discusses theory of fluids on the macro-micro-and nano-scales, and devices that use small volumes of fluid for biomedical applications including diagnostics and cellular control. Topics include microscale fluid mechanics, heat and mass transfer, advanced micro/nanotechnology, and methods used in modern fluid dynamics projects.

**BME 510. Biomedical Instrumentation. 3 Credits.**
This course will expose students to fundamentals of medical instrumentation including biosensors, transducers, biomedical signals, signal processing and electrical safety. Instruments for biomedical measurements of cardiovascular, respiratory, and other vital functions will be fabricated and tested in laboratory exercises. Biomedical applications will be discussed.

**BME 554. Introduction to Bioelectrics. 3 Credits.**
This course covers the electrical properties of cells and tissues as well as the use of electrical and magnetic signals and stimuli in the diagnosis and treatment of disease. Typical topics to be covered include basic cell physiology, endogenous electric fields in the body, electrocardiography, cardiac pacing defibrillation, electrotherapy, electroporation, electrotherapy in wound healing. In addition ultra-short electrical pulses for intracellular manipulation and the application of plasmas to biological systems will be covered.

**BME 630. Advanced Bioelectrics. 3 Credits.**
Lecture, 3 hours; 3 credits. A one-semester course covering advanced topics in bioelectrics. The course will cover advanced applications of pulsed power and plasma in the medical, biological and environmental fields. (Cross listed with ENGN 630).

**BME 720. Modern Biomedical Instrumentation. 3 Credits.**
Lecture, 3 hours. 3 credits. This course covers the design of modern biomedical instruments including select diagnostic, assistive, therapeutic, prosthetic, imaging, and virtual devices and systems. Techniques for mechanical, electrical, and chemical sensor and transducer design; stimulation and measurement; data acquisition; digital signal processing; and data visualization will be examined.

**BME 721. Quantitative Analysis of Human Physiological Systems I. 3 Credits.**
Lecture, 3 hours. 3 credits. The first of a two-course series covering human physiology and pathophysiology, with an emphasis on quantitative modeling, simulation, and analysis of the function of cells, organs, and systems. This course focuses on cellular physiology, including homeostasis, membrane ion channels, excitability, calcium dynamics, and intercellular communication.

**BME 722. Quantitative Analysis of Human Physiological Systems II. 3 Credits.**
Lecture, 3 hours; 3 credits. Prerequisite: BME 721 or 821. The second course of a two-course series covering human physiology and pathophysiology with an emphasis on quantitative modeling, simulation, and analysis of the function of cells, organs, and systems. This course focuses on systems physiology, including the heart, respiration, muscle, kidneys, and the endocrine system.

**BME 723. Engineering Consultation in Medical Technology. 3 Credits.**
Lecture, 3 hours. 3 credits. The course exposes students to professional and ethical issues encountered in consulting for groups engaged in biomedical engineering innovation and design. Students consult on real world projects in areas of medical technologies or related innovations within the biomedical community. Analysis and evaluation assignments and reports on design strategies, techniques, and tools are addressed.

**BME 724. Neural Engineering. 3 Credits.**
Lecture, 3 hours. 3 credits. This course presents engineering techniques for the restoration and augmentation of human function via direct interactions between the nervous system and artificial devices, with particular emphasis on brain-computer interfaces. Novel interfaces, hardware and computational issues, and practical and ethical considerations will also be covered.

**BME 725. Advanced Microelectrode Techniques. 3 Credits.**
Lecture, 2 hours; lab, 2 hours. 3 credits. Models and measurements of cellular transmembrane voltages and extracellular biopotentials with microelectrodes and electrode arrays are described. Origins of the voltages, quantitative models for biopotentials and techniques for measurements are examined. Students fabricate microelectrodes and perform an experiment with living cells.

**BME 742. Multibody Dynamics: Theories and Applications. 3 Credits.**
Lecture, 3 hours; 3 credits. Prerequisite: permission of instructor. Basic theories are presented for formulation of equations of kinematics and dynamics of systems made of interconnected bodies. Topics include constrained motion, principle of virtual work and constrained dynamics. Examples cover robotic motion and biomechanics applications such as human locomotion.
BME 751. Biostatistics: Fundamentals and Applications. 3 Credits.
Descriptive statistics, probability distributions and computations, estimation, hypothesis testing (one-and two-sample inferences), regression methods (simple and multiple), methods for analyzing categorical data (Fisher’s exact test, McMenar’s test, chi-square tests, Cochran-Mantel-Haenszel methods), analysis of variance including non-parametric alternatives, multi-sample inference. Appropriate examples will be given from health sciences and biomedical engineering. Prerequisite: Graduate status.

BME 783. Digital Image Processing. 3 Credits.
Principles and techniques of two-dimensional processing of images. Concepts of scale and spatial frequency. Image filtering in spatial and transform domains. Applications include image enhancement and restoration, image compressing, biomedical imaging for diagnosis of disease, and image segmentation for computer vision. Prerequisites: ECE 782 or ECE 882.

BME 791. Biomedical Engineering Innovation Seminar. 1-3 Credits.
Seminar, 1-3 hours; 1-3 credits. This course is for students interested in research that originates from a clinical need, is developed in the laboratory and is then implemented clinically. Seminars by healthcare professionals emphasize clinical needs. Students follow the biodesign innovation process toward creation of biotechnologies and devices that address needs.

BME 795. Topics. 1-3 Credits.
Lecture, 3 hours. 3 credits. Special courses covering selected graduate-level topics in biomedical engineering.

BME 820. Modern Biomedical Instrumentation. 3 Credits.
Lecture, 3 hours. 3 credits. This course covers the design of modern biomedical instruments including select diagnostic, assistive, therapeutic, prosthetic, imaging, and virtual devices and systems. Techniques for mechanical, electrical, and chemical sensor and transducer design; stimulation and measurement; data acquisition; digital signal processing; and data visualization will be examined.

BME 821. Quantitative Analysis of Human Physiological Systems I. 3 Credits.
Lecture, 3 hours. 3 credits. The first of a two-course series covering human physiology and pathophysiology, with an emphasis on quantitative modeling, simulation, and analysis of the function of cells, organs, and systems. This course focuses on cellular physiology, including homeostasis, membrane ion channels, excitability, calcium dynamics, and intercellular communication.

BME 822. Quantitative Analysis of Human Physiological Systems II. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: BME 721 or 821. The second course of a two-course series covering human physiology and pathophysiology with an emphasis on quantitative modeling, simulation, and analysis of the function of cells, organs, and systems. This course focuses on systems physiology, including the heart, respiration, muscle, kidneys, and the endocrine system.

BME 823. Engineering Consultation in Medical Technology. 3 Credits.
Lecture, 3 hours. 3 credits. The course exposes students to professional and ethical issues encountered in consulting for groups engaged in biomedical engineering innovation and design. Students consult on real world projects in areas of medical technologies or related innovations within the biomedical community. Analysis and evaluation assignments and reports on design strategies, techniques, and tools are addressed.

BME 824. Neural Engineering. 3 Credits.
Lecture, 3 hours. 3 credits. This course presents engineering techniques for the restoration and augmentation of human function via direct interactions between the nervous system and artificial devices, with particular emphasis on brain-computer interfaces. Novel interfaces, hardware and computational issues, and practical and ethical considerations will also be covered.

BME 825. Advanced Microelectrode Techniques. 3 Credits.
Lecture, 2 hours; lab, 2 hours. 3 credits. Models and measurements of cellular transmembrane voltages and extracellular biopotentials with microelectrodes and electrode arrays are described. Origins of the voltages, quantitative models for biopotentials and techniques for measurements are examined. Students fabricate microelectrodes and perform an experiment with living cells.

BME 842. Multibody Dynamics: Theories and Applications. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: permission of instructor. Basic theories are presented for formulation of equations of kinematics and dynamics of systems made of interconnected bodies. Topics include constrained motion, principle of virtual work and constrained dynamics. Examples cover robotic motion and biomechanics applications such as human locomotion.

BME 851. Biostatistics: Fundamentals and Applications. 3 Credits.
Descriptive statistics, probability distributions and computations, estimation, hypothesis testing (one-and two-sample inferences), regression methods (simple and multiple), methods for analyzing categorical data (Fisher’s exact test, McMenar’s test, chi-square tests, Cochran-Mantel-Haenszel methods), analysis of variance including non-parametric alternatives, multi-sample inference. Appropriate examples will be given from health sciences and biomedical engineering. Prerequisite: Graduate status.

BME 883. Digital Image Processing. 3 Credits.
Principles and techniques of two-dimensional processing of images. Concepts of scale and spatial frequency. Image filtering in spatial and transform domains. Applications include image enhancement and restoration, image compressing, biomedical imaging for diagnosis of disease, and image segmentation for computer vision. Prerequisites: ECE 783/883.

BME 891. Biomedical Engineering Innovation Seminar. 1-3 Credits.
Seminar, 1-3 hours; 1-3 credits. This course is for students interested in research that originates from a clinical need, is developed in the laboratory and is then implemented clinically. Seminars by healthcare professionals emphasize clinical needs. Students follow the biodesign innovation process toward creation of biotechnologies and devices that address needs.

BME 895. Topics. 1-3 Credits.
Lecture, 3 hours. 3 credits. Special courses covering selected graduate-level topics in biomedical engineering.

BME 899. PHD Dissertation Research. 1-9 Credits.
1-9 credits. Directed research for the doctoral dissertation.

BNAL 507. Advanced Management Science. 3 Credits.
Prerequisites: OPMT 611 or permission of the instructor. Formulation and solution of mathematical models and their uses and limitations in business. Topics include linear, integer, and goal programming, network models, queuing, utility theory, and Markov analysis. Cases and computer solution of topics introduced in this class, as well as topics from BNAL 206 and BNAL 306, are incorporated.

BNAL 532. Forecasting. 3 Credits.
Prerequisites: OPMT 611. Applications include both shorter term forecasting for sales and operations management as well as forecasting for long term planning. Emphasis is on statistical methods to obtain and evaluate forecasts. Statistical models are implemented using standard software such as MINITAB or EXCEL.
BNAL 576. Simulation Modeling and Analysis for Business Systems. 3 Credits.
Methods and techniques of digital computer simulation of business systems utilizing knowledge of data processing, statistics, probability theory and operations research. Areas of application include systems that experience waiting problems. Topics include the methodology for the construction of computer simulation models, model verification, validation, and analysis of results.

BNAL 600. Foundations of Statistics for Business and Economics. 3 Credits.
Descriptive statistics, probability and probability distributions, estimation and hypothesis testing, analysis of variance, simple and multiple regression, and introduction to time series analysis. Computer software, as a tool for problem solving, will be utilized throughout the course. Emphasis is on the interpretation, in a business context, of statistical information for both simple and complex models.

BNAL 621. Simulation Modeling for Business Systems. 3 Credits.
Prerequisites: BNAL 600 and OPMT 611 and instructor approval. This course covers both the theory and application of simulation modeling and analysis to business systems. Both discrete-event and continuous simulation modeling approaches are covered, using a major commercial simulation package. Emphasis will be on the use of simulation as a tool to support business decision making.

BNAL 641. Supply Chain Management and Logistics. 3 Credits.
Prerequisites: BNAL 611. Supply chain management integrates all activities associated with the flow of materials and information from product start to customers. Examples include order processing, warehousing, inventory management, transportation and logistics, and the costs and information systems supporting these activities. Particular application is made to global logistics systems supporting port and maritime activities. Supply chain relationships can be improved through effective integration of management and via such technologies as the World Wide Web, electronic data exchange, and enterprise resource planning (ERP).

BNAL 667. Cooperative Education. 1-3 Credits.
Approval for enrollment and allowable credits are determined by the department and Career Management in the semester prior to enrollment.

BNAL 668. Internship in Business Analytics. 1-3 Credits.
Approval for enrollment and allowable credits are determined by the department and Career Management in the semester prior to enrollment.

BNAL 695. Selected Topics in Business Analytics. 3 Credits.
Prerequisites: Permission of the department chair and graduate program director. Advanced topics in business analytics offered periodically.

BNAL 697. Independent Study. 3 Credits.
Prerequisites: OPMT 611. Affords students the opportunity to undertake independent study under the direction of a faculty member.

BNAL 700. Linear Methods for Business Decisions. 1 Credit.
An introduction to matrix algebra and optimization with emphasis on those techniques necessary for mathematical analysis of advanced statistical models used in business research. Applications of use of matrix algebra for analyzing statistical models are discussed throughout the course.

BNAL 711. Multivariate Statistical Methods for Business. 3 Credits.
Prerequisites: BNAL 600 or equivalent. An applied study of statistical methods including analysis of variance, ANCOVA, multiple regression, discriminant analysis, time series regression, and exploratory factor analysis. Data analyzed using a computerized statistical package. Emphasizes development of the student’s ability to use statistics for independent research.

BNAL 712. Advanced Statistical Models in Business Research. 3 Credits.
Prerequisites: BNAL 711. Advanced statistical models that are commonly encountered in business research. Topics include confirmatory factor analysis as well as structural equation modeling. Emphasis is on model development as well as use of statistical software in analyzing realistic business-oriented data sets.

BNAL 715. Multilevel Modeling in Business Research. 1 Credit.
Prerequisites: BNAL 711 or permission of the instructor. This course introduces the fundamentals of multilevel modeling. Alternative methods of analysis are discussed and critiqued. Use of specialized multilevel modeling software is demonstrated. Topics include a detailed discussion of the issues associated with variable centering. Applications to business research investigations are emphasized.

BNAL 721. Simulation Modeling for Business Systems. 3 Credits.
Prerequisites: MSIM 601 or MSIM 611 or BNAL 476 or BNAL 576 and permission of the instructor. This course covers both the theory and application of simulation modeling and analysis to business systems. Both discrete-event and continuous simulation modeling approaches are covered, using a major commercial simulation package. Emphasis will be on the use of simulation as a tool to support business decision making.

BNAL 722. Agent-Based Simulation and Modeling. 3 Credits.
Prerequisites: MSIM 601 or MSIM 611 or BNAL 576 or BNAL 721 or BNAL 821. This course will explore both the conceptual and technical aspects of agent-based simulation, particularly as utilized for modeling of business systems. Students will explore the roots and literature of agent-based modeling and related fields. Students will also learn to develop agent-based simulation models using a major commercial simulation package.

BNAL 796. Selected Topics in Business Analytics. 1-3 Credits.
The advanced study of selected topics not offered on a regular basis.

BNAL 800. Theoretical Foundations in ISR. 3 Credits.
Instructor approval required. A survey of research methodology in business information technology research including empirical, behavioral and computational approaches in different types of problem domains. The approach will be interdisciplinary.

BNAL 821. Simulation Modeling for Business Systems. 3 Credits.
Prerequisites: MSIM 601 or MSIM 611 or BNAL 476 or BNAL 576 and permission of instructor. This course covers both the theory and application of simulation modeling and analysis to business systems. Both discrete-event and continuous simulation modeling approaches are covered, using a major commercial simulation package. Emphasis will be on the use of simulation as a tool to support business decision making.

BNAL 822. Agent-Based Simulation and Modeling. 3 Credits.
Prerequisites: MSIM 601 or MSIM 611 or BNAL 576 or BNAL 721 or BNAL 821. This course will explore both the conceptual and technical aspects of agent-based simulation, particularly as utilized for modeling of business systems. Students will explore the roots and literature of agent-based modeling and related fields. Students will also learn to develop agent-based simulation models using a major commercial simulation package.

BUSN - Business Administration

BUSINESS ADMINISTRATION Courses

BUSN 600. Foundations of Business. 12 Credits.
This course is a team-taught, integrated series of modules that addresses the basic skills and concepts required to deal with intra-organizational issues and local business challenges and opportunities within the GEMBA program. While this an inter-disciplinary course, there is special emphasis on financial and managerial accounting, the language of business, and operations management, the basis of organizational excellence. In addition, each student will learn their leadership strengths and weaknesses, and develop a personal development plan to work on during the year.

BUSN 601. Action Learning I. 3 Credits.
Under the direction of a core faculty advisor, students in the GEMBA program will propose to study a business challenge which has strategic significance to their sponsoring organization and builds on concepts and skills taught in the program. Special emphasis is placed on defining the challenge and the scope of the intended work.
BUSN 602. Organizational Issues in Business. 12 Credits.
Prerequisites: BUSN 600. This course is a team-taught, integrated series of modules that address the intermediate skills and concepts required to deal with interorganizational issues and national business challenges and opportunities within the GEMBA program. While this is an interdisciplinary course, special emphasis is placed on marketing, human resource management, and logistics. In addition, one residency period will be conducted in a country outside of the United States and students will work one-on-one with an executive coach on their personal development plans.

BUSN 603. Action Learning II. 3 Credits.
Under the direction of a core faculty advisor, students in the GEMBA program will collect and analyze data on their strategic issue. Special emphasis will be placed on reading deeply about concepts and frameworks related to the strategic issue. Prerequisites: BUSN 601.

BUSN 604. International Issues in Business. 12 Credits.
Prerequisites: BUSN 602. This course is a team-taught, integrated series of modules that address the advanced skills and concepts required to deal with global business and international business challenges and opportunities within the GEMBA program. While this is an interdisciplinary course, special emphasis will be placed on international strategies and tactics, as well as leadership and organizational change. In addition, one residency period will be conducted in a country outside of the United States and students will work one-on-one with an executive coach on their personal development plans.

BUSN 605. Action Learning III. 3 Credits.
Under the direction of a core faculty advisor, students in the GEMBA program will write up and provide an oral presentation on their strategic issue. Special emphasis will be placed on estimating the return on investment to the sponsoring organization if it adopts the strategic recommendations. Prerequisites: BUSN 603.

BUSN 800. Seminar in International Business. 3 Credits.
This course will provide students with a comprehensive understanding of the environmental issues, institutions, opportunities, challenges, problems and managerial processes that are unique to international business. Both the micro and macro contexts in which international business is conducted will be examined.

BUSN 801. Research/Teaching Colloquium. 1 Credit.
The one-hour Research/Teaching Colloquium is mainly intended to promote research/teaching competencies of doctoral students through their exposure to presentations on and discussions of various topics dealing with research, writing, publishing and effective teaching. The presentations may be by faculty members, outside speakers or doctoral students.

BUSN 999. Business. 1-10 Credits.
Pass/fail registration for graduate students.

CCL - Community College Leadership

COMMUNITY COLLEGE LEADERSHIP Courses

CCL 685. Topics in Community College Leadership. 1-3 Credits.
Topics in Community College Leadership.

CCL 695. Topics in Community College Leadership. 1-3 Credits.
TOPICS IN COMMUNITY COLLEGE LEADERSHIP.

CCL 720. Community College Leadership. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: acceptance into the doctoral program or permission of the instructor. A doctoral level seminar intended to provide theoretical and practical background on issues related to community college leadership and assist the student to develop the skills necessary to fulfill the responsibilities of a senior community college administrative leadership position. Of particular importance are skills needed for community college deans, vice presidents and presidents.

CCL 724. Community College Finance. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: acceptance into the doctoral program or permission of the instructor. A doctoral level seminar intended to provide information about the financing and budgeting processes that are practiced in community colleges. This will be accomplished by examining the budget development and budget planning process and a survey of sources and uses of funds as well as the functions and techniques of responsible management of resources.

CCL 726. Community College Curriculum and Program Development. 3 Credits.
3 credits. Prerequisite: acceptance into the doctoral program or permission of the instructor. A doctoral level seminar intended to assist students to understand the development and management of the community college curriculum. It will do this by (1) examining processes practiced in the identification of courses and degree programs, (2) the review and approval processes of individual programs and courses, (3) assessment and other accountability activities, and (4) the authorizing processes and procedures for establishing or terminating courses or programs.

CCL 768. Internship in Community College Leadership. 3-6 Credits.
3 to 6 credits. Prerequisite: acceptance into the doctoral program or permission of the instructor. The purpose of this course is to allow students to obtain hands-on experience in a leadership role at a community college setting. The student will learn about leadership skills at the community college by observing his or her mentor/site supervisor and by being given leadership tasks associated with the site he or she has chosen.

CCL 795. Topics in Community College Leadership. 1-3 Credits.
1 to 3 credits. Prerequisite: permission of the instructor.

CCL 820. Community College Leadership. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: acceptance into the doctoral program or permission of the instructor. A doctoral level seminar intended to provide theoretical and practical background on issues related to community college leadership and assist the student to develop the skills necessary to fulfill the responsibilities of a senior community college administrative leadership position. Of particular importance are skills needed for community college deans, vice presidents and presidents.

CCL 824. Community College Finance. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: acceptance into the doctoral program or permission of the instructor. A doctoral level seminar intended to provide information about the financing and budgeting processes that are practiced in community colleges. This will be accomplished by examining the budget development and budget planning process and a survey of sources and uses of funds as well as the functions and techniques of responsible management of resources.

CCL 826. Community College Curriculum and Program Development. 3 Credits.
3 credits. Prerequisite: acceptance into the doctoral program or permission of the instructor. A doctoral level seminar intended to assist students to understand the development and management of the community college curriculum. It will do this by (1) examining processes practiced in the identification of courses and degree programs, (2) the review and approval processes of individual programs and courses, (3) assessment and other accountability activities, and (4) the authorizing processes and procedures for establishing or terminating courses or programs.

CCL 830. Community College Politics and Policy Development. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: acceptance into the doctoral program or permission of the instructor. This course will examine the political factors that may influence educational policy-decisions at community colleges and other institutions of higher education. This course will encourage students to pursue self-directed study of the relationships community college leaders build with community college boards of trustees, county commissioners, state legislators (with emphasis on the Commonwealth of Virginia), and federal representatives. The course also will require students to research and participate in debates on current political and ethical issues affecting the community college.
CDSE 868. Internship in Community College Leadership. 3-6 Credits.
3 to 6 credits. Prerequisite: acceptance into the doctoral program or permission of the instructor. The purpose of this course is to allow students to obtain hands-on experience in a leadership role at a community college setting. The student will learn about leadership skills at the community college by observing his or her mentor/site supervisor and by being given leadership tasks associated with the site he or she has chosen.

CCL 881. Dissertation Seminar. 3 Credits.
3 credits. A seminar that focuses on the design, implementation, and evaluation of community colleges under real-life conditions in the field. Students and faculty work with community college decision makers utilizing problem solving skills and analysis.

CCL 895. Topics in Community College Leadership. 1-3 Credits.
1 to 3 credits. Prerequisite: permission of the instructor.

CCL 899. Dissertation. 1-12 Credits.
1 to 12 credits.

CCL 999. Community College Leadership 999. 1 Credit.
1 credit. A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

CDSE - Comm Disorders & Special Educ

COMM DISORDERS SPECIAL EDUC Courses

CDSE 595. Topics in Education. 1-6 Credits.
1-6 credits. Selected topics in education.

CDSE 597. Independent Study in Special Topics in Education. 1-4 Credits.
1-3 credits. Independent study of selected topics.

CDSE 636. Problems in Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ESSE 635 and/or permission of the instructor. Application of research procedures culminating in student study of selected topics.

CDSE 695. Topics in Education. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits each semester. Prerequisite: permission of the instructor. This course offers selected topics designed to permit small groups of qualified students to work on subjects of mutual interest in the special education field.

CDSE 698. Thesis. 3-6 Credits.
3-6 credits. Prerequisite: permission of instructor.

CDSE 699. Thesis. 3-6 Credits.
3-6 credits. Prerequisite: permission of instructor.

CDSE 795. Topics in Education. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits each semester. Prerequisite: permission of instructor. The advanced study of selected topics and emergent research related issues that permits small groups of qualified students to study subjects of mutual interest, which, due to their specialized nature, may not be offered regularly.

CDSE 895. Topics in Education. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits each semester. Prerequisite: permission of instructor. The advanced study of selected topics and emergent research related issues that permits small groups of qualified students to study subjects of mutual interest, which, due to their specialized nature, may not be offered regularly.

CDSE 999. Early Childhood/Special Education 999. 1 Credit.
1 credit. A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

CEE - Civil/Environmental Engineer

CIVIL/ENVIRONMENTAL ENGINEER Courses

CEE 511. Concrete Design II. 3 Credits.
Lecture 3 hours; 3 credits. Analysis and design of complex concrete structural members, flat and two-way slabs, special topics and introduction to prestressed concrete design.

CEE 514. Masonry Structures Design. 3 Credits.
Lecture 3 hours; 3 credits. Masonry materials, reinforced beams and lintels, walls, columns and pilasters, shear walls, and buildings.

CEE 515. Steel Structures Design. 3 Credits.
Lecture 3 hours; 3 credits. Load and resistance factor design methods for steel structures.

CEE 516. Wood Structures Design. 3 Credits.
Lecture 3 hours; 3 credits. Design of wood structures based on national design specification and load and resistance factor design.

CEE 530. Foundation Engineering. 3 Credits.
Lecture 3 hours; 3 credits. Subsurface exploration, site preparation, design of shallow and deep foundations, and retaining structures.

CEE 531. Earth Structures Design with Geosynthetics. 3 Credits.
Lecture 3 hours; 3 credits. Seepage and stability analysis and design of manmade and natural slopes and retaining structures. Applications of geosynthetic material to seepage control, reinforcement of earth works, and containment of hazardous materials.

CEE 532. Introduction to Earthquake Engineering. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: permission of the instructor. An overview of earthquake processes and details of the characteristics of destructive ground motion; the effects of such motion on civil engineering structures; reviews of current design practice in mitigating earthquake hazards for various civil engineering structures such as buildings, bridges, dams, lifelines, ports and harbors.

CEE 540. Hydraulic Engineering. 3 Credits.
Lecture 3 hours; 3 credits. Hydraulic transients; flow control structures; computer analysis of hydraulic systems; design of pipelines, open channels and culverts.

CEE 546. Urban Stormwater Hydrology. 3 Credits.
Lecture 3 hours; 3 credits. Storm rainfall analysis, design rainfall hyetographs, runoff calculation procedures, detention basins, use of mathematical models to analyze and design urban storm drainage systems.

CEE 547. Groundwater Hydraulics. 3 Credits.
Lecture 3 hours; 3 credits. Description of well hydraulics in single and multiple well systems. Determination of aquifer parameters from pumping tests. Use of computer models to determine drawdowns due to multiple well systems.

CEE 550. Water Distribution and Wastewater Collection System Design. 3 Credits.
Lecture 3 hours; 3 credits. Design of water distribution systems, sanitary sewer systems and appurtenances.

CEE 552. Air Quality. 3 Credits.
Study of air quality management standards and regulations and pollutant dynamics. Design and operation of emission control equipment for mobile and stationary sources of air pollution.
CEE 554. Hazardous Wastes, 3 Credits.
Study of sources, generation rates and characteristics of hazardous wastes and their regulation, handling, and design of treatment and disposal facilities.

CEE 558. Sustainable Development, 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of instructor. Overview of social, economical, technical and environmental aspects of regional, national and international efforts to achieve sustainable development. Discussion of the integration of industrial activity and ecological concerns utilizing principles of zero emissions, pollution prevention and design for the environment.

CEE 559. Biofuels Engineering, 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of the instructor. Course covers the overview of renewable energy sources; fundamentals of biofuels; biomass and types of biomass (e.g., woody biomass, forest residues, agricultural residues, energy crops); composition of lignocelluloses (cellulose, hemicellulose, and lignin); biomass conversion technologies; thermochemical, supercritical water, and biochemical conversion processes; types of biofuels from biomass; liquid fuels (bioethanol, bio-oil, biocrude, and hydrocarbons); gaseous fuels (synthesis gas, hydrogen, biodiesel); solid fuels (biochar, torrefied biomass); biodiesel from vegetable oils, algae to biofuels; value-added processing of biofuel residues; economic and environmental assessments; policies and future R&D.

CEE 570. Transportation Fundamentals, 3 Credits.
Lecture 3 hours; 3 credits. This course surveys the current practice of transportation engineering in the United States. It focuses on various ground transportation modes and covers policy, institutional planning and operational issues. Students are introduced to planning models, capacity analysis, traffic impact analysis, and parking studies.

CEE 571. Transportation Operations, 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: CEE 570. This is the first course in transportation operations and traffic flow theory. Topics include traffic engineering studies, capacity analysis, intersection control, traffic flow models, shockwave analysis, signal warrant analysis, and safety analysis. Course includes applications of modeling and simulation to isolated intersections.

CEE 576. Transportation Operations Applications, 3 Credits.
Lecture 3 hours; 3 credits. This course deals with operations applications in transportation. It covers theory and practical examples of traffic engineering studies, capacity analysis, intersection control, signal warrant analysis, and safety analysis. Topics discussed also include traffic management, access management, traffic calming, and regional operations management.

CEE 582. Introduction to Coastal Engineering, 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: permission of the instructor. Classical small amplitude wave theory, wave transformations in shallow water, shoaling, refraction, diffraction, reflection, breaking. Wave induced near shore currents and sediment transport processes. Alternatives to mitigate coastal erosion processes. Introduction to coastal structures.

CEE 595. Topics in Civil and Environmental Engineering, 1-3 Credits.
Special topics of interest with emphasis placed on recent developments in civil and/or environmental engineering. Prerequisites: Permission of the instructor.

CEE 650. Pollution Prevention, 3 Credits.

CEE 667. Cooperative Education, 1-3 Credits.
1-3 credits (may be repeated for credit). Prerequisite: approval by the department and Career Management in accordance with the policy for granting credit for cooperative education programs. Available for pass/fail grading only. Student participation for credit based on the academic relevance of the work experience, criteria, and evaluative procedures as formally determined by the department and Career Management prior to the semester in which the work experience is to take place.

CEE 668. Internship, 1-3 Credits.
1-3 credits. Prerequisite: approval by department and Career Management Center. Academic requirements will be established by the department and will vary with the amount of credit desired. Allows students an opportunity to gain short duration career-related experience.

CEE 669. Practicum, 1-3 Credits.
1-3 credits. Prerequisite: approval by department and Career Management Center. Academic requirements will be established by the department and will vary with the amount of credit desired. Allows students an opportunity to gain short duration career-related experience.

CEE 695. Topics in Civil and Environmental Engineering, 1-3 Credits.
Prerequisites: Permission of the instructor. Special topics of interest with emphasis placed on recent developments in civil and/or environmental engineering.

CEE 697. Independent Study in Civil and Environmental Engineering, 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor. Individual analytical, experimental and/or design study selected by the student. Approved and supervised by the advisor.

CEE 698. Master's Project, 1-3 Credits.
1-3 credits. Individual project, investigation under the direction of the student’s major professor.

CEE 699. Thesis, 1-6 Credits.
1-6 credits. Research leading to the Master of Science thesis.

CEE 700. Civil and Environmental Engineering Experimental Design, 3 Credits.
Lecture 3 hours; 3 credits. Graduate-level overview of engineering experimental design and analysis with emphasis on statistical methods; practical and proper statistical methods applicable to multidisciplinary, real-world civil and environmental engineering problems.

CEE 710. Structural Dynamics, 3 Credits.
Lecture 3 hours; 3 credits. Free and forced vibration of discrete and continuous systems; elastic and inelastic response of structures under dynamic loads.

CEE 711. Finite Element Analysis, 3 Credits.
Lecture 3 hours; 3 credits. To provide an understanding of the finite element method (FEM) as derived from an integral formulation perspective. To demonstrate the solutions of (1-D and 2-D) continuum mechanics problems such as solid mechanics, fluid mechanics and heat transfer.

CEE 712. Advanced Reinforced Concrete, 3 Credits.
Lecture 3 hours; 3 credits. Ultimate-strength theory, yield line methods, limit design, and other relevant advanced topics in the theory and design of concrete structures.

CEE 713. Prestressed Concrete, 3 Credits.
Lecture 3 hours; 3 credits. Analysis and design of prestressed concrete members and structures. Shrinkage, creep and losses, shear, bond and anchorages are discussed.

CEE 714. Advanced Structural Analysis, 3 Credits.
Lecture 3 hours; 3 credits. Elastic analysis of framed structures using matrix and numerical techniques.

CEE 715. Engineering Optimization I, 3 Credits.
Lecture 3 hours; 3 credits. Formulation and solution algorithms for Linear Programming (LP) problems. Unconstrained and constrained nonlinear programming (NLP) problems. Optimum solution for practical engineering systems. (Cross-listed with ME 715/815.)

CEE 717. Bridge Structures Design, 3 Credits.
Lecture 3 hours; 3 credits. Design of steel, concrete, and composite bridges using modern techniques and current specifications.

CEE 719. Inelastic Structures, 3 Credits.
Lecture 3 hours; 3 credits. Inelastic analysis and behavior of framed structures.
**CEE 720. Structural Stability.** 3 Credits. Lecture 3 hours; 3 credits. Fundamentals of elastic and inelastic stability of beams, columns and frames.

**CEE 721. Plates.** 3 Credits. Lecture 3 hours; 3 credits. Classical and modern methods for the solution of plates of various shapes and boundary conditions, continuous and axially loaded plates and plates on elastic supports. Design examples.

**CEE 722. Cluster Parallel Computing.** 3 Credits. Lecture 3 hours; 3 credits. Detailed numerical step-by-step procedures to exploit parallel and sparse computation under MPI (Message Passing, Interface) computer environments are explained. Large-scale engineering/science applications are emphasized. Simultaneous linear equations are discussed.

**CEE 723. Seismic Design of Steel Structures.** 3 Credits. Lecture 3 hours; 3 credits. Analysis and design of steel structures under seismic loading conditions, introduction to design specifications for steel structures.

**CEE 724. Retrofitting Methods for Bridges and Buildings.** 3 Credits. Retrofitting methods for bridges and buildings combined with related advanced structural analysis and design techniques.

**CEE 730. Advanced Foundation Engineering.** 3 Credits. Lecture 3 hours; 3 credits. Advanced analysis and design of shallow and deep foundations and retaining structures.

**CEE 731. Advanced Soil Mechanics.** 3 Credits. Lecture 3 hours; 3 credits. Detailed study of shear strength of soils and its application to slope stability and embankment design and analysis. Advanced laboratory shear tests are included.

**CEE 732. Engineering Behavior of Soils.** 3 Credits. Lecture 3 hours; 3 credits. Detailed study of physicochemical behavior of soils, fabric, rheology, effective stress path, and their applications to various geotechnical engineering problems.

**CEE 733. Soil Dynamics.** 3 Credits. Lecture 3 hours; 3 credits. Study of soil behavior under dynamic loadings. Laboratory and field techniques for determining soil properties and liquefaction potential. Design examples.

**CEE 741. Open Channel Flow.** 3 Credits. Lecture 3 hours; 3 credits. Momentum and energy principles, design of open channels, use of mathematical models for flow calculations in rivers, introduction to unsteady open channel flow.


**CEE 751. Physicochemical Treatment Processes.** 3 Credits. Lecture 3 hours; 3 credits. Physical and chemical processes used in the treatment of water and waste water are covered. Separation, isolation and reaction processes are characterized as well as reactor engineering.

**CEE 752. Biological Wastewater Treatment.** 3 Credits. Lecture 3 hours; 3 credits. The use of microorganisms to treat domestic and industrial waste waters for organics and nutrient removal are studied. Characteristics of individual waste water components and the appropriate treatment processes to remove these components are covered.

**CEE 753. Advanced Processes for Water and Wastewater Treatment.** 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: CEE 751 and 752. Theory, operation and application of advanced water and waste water treatment systems, including land application, dissolved solids, organic contaminant and nutrient removal processes. Emphasis on system development for waste water reclamation/recycling.

**CEE 754. Environmental Engineering Microbiology.** 3 Credits. Lecture 2 hours; laboratory 2 hours; 3 credits. A lecture and laboratory course dealing with the study of the principles and applications of microbiology in waste water treatment, water treatment, stream self-purification and their effects in environmental engineering.

**CEE 755. Water Quality Management.** 3 Credits. Lecture 3 hours; 3 credits. Characterization of water quality in natural systems and the human activities that result in contaminant input to these systems are studied. Management practices for minimizing contaminant input and for restoring contaminated waters are discussed.

**CEE 756. Water Quality Modeling.** 3 Credits. Lecture 3 hours; 3 credits. Formulation of mathematical equations to describe the fate and transport of aqueous contaminants in dynamic surface water systems. Use of water quality computer models to predict various contamination scenarios.

**CEE 761. Water Resources Process and Analysis Methods.** 3 Credits. Interactive hydrologic processes in water resource; modifications of climate change to these processes; modern simulation and systematic analysis methods incorporating the modifications into practices of water resource planning, utilization, protection, and engineering.

**CEE 762. Aquatic Chemistry in Environmental Engineering.** 3 Credits. Lecture 3 hours; 3 credits. Chemical reactions in natural and engineered systems are studied with emphasis placed on developing kinetic expressions and assessing chemical equilibrium. Kinetic and equilibrium expressions are applied to engineering problems to predict the reaction time and products of specific reactions.

**CEE 770. Transportation Safety.** 3 Credits. Lecture 3 hours; 3 credits. This course focuses on major transportation safety issues including transportation safety goals, safety of various transportation modes, identification of problematic locations, selection of safety countermeasures and their evaluation, safety data and modeling issues.

**CEE 771. Transportation Operations II.** 3 Credits. Lecture 3 hours; 3 credits. This is the second course in transportation operations and traffic flow theory. Topics covered include design of progressive signal systems, queueing theory, car following models, and applications of microscopic traffic simulation to corridor studies.

**CEE 772. Intelligent Transportation Systems.** 3 Credits. Lecture 3 hours; 3 credits. This course examines how ITS can be used to enhance mobility and safety. The topics covered in the course include systems engineering approach to ITS, traveler response to technologies and information, ITS planning and evaluation, and ITS deployment and operational performance.

**CEE 774. Transportation Planning.** 3 Credits. Lecture 3 hours; 3 credits. This course covers transportation planning processes that include policy direction, transportation data, travel demand forecasting models, and decision-making/stakeholders issues.

**CEE 775. Transportation Network Models and Optimization.** 3 Credits. Lecture 3 hours; 3 credits. This course is designed to show the broad applicability of network modeling techniques to the problems of designing and operating various transportation systems. Topics to be covered include fundamentals of graph theory, routing algorithm network flow problems, assignment and matching problems, facility location problems, and relevant optimization techniques.

CEE 782. Design of Coastal Structures. 3 Credits.
Lecture 3 hours; 3 credits. Nonlinear wave theories; wave forces on slender piles and seawalls; design of rubblemound structures; design philosophy, initial costs, maintenance costs, optimized design using stochastic methods; design of renourished beaches. Advanced alternative solutions for shore protection.

CEE 787. Dredging and Beach Engineering. 3 Credits.
Lecture 3 hours; 3 credits. Types of dredges, factors affecting dredge performance; hydraulic dredges (cutter, hopper) and mechanical dredges systems (bucket, clamshell, etc.); shoaling rate determination; inlet sand bypassing systems; beach renourishment schemes. Design of beach renourishment/projects.

CEE 788. Coastal Hydrodynamics and Sediment Transport Processes. 3 Credits.
Lecture 3 hours; 3 credits. Time averaging wind waves and radiation stresses. Wave setup, longshore currents, rip currents and nearshore circulation. Theoretical models for regular (monochromatic) and irregular waves. Wave energy dissipation models in surf zones. Vertical structure and undertow models. Sediment concentration and transport models for predicting bathymetric change.

CEE 789. Computational Environmental Fluid Dynamics. 3 Credits.

CEE 795. Topics in Civil and Environmental Engineering. 1-3 Credits.
Special topics of interest with emphasis placed on recent developments in civil and/or environmental engineering. Prerequisites: Permission of the instructor.

CEE 797. Independent Study. 1-3 Credits.

CEE 800. Civil and Environmental Engineering Experimental Design. 3 Credits.
Lecture 3 hours; 3 credits. Graduate-level overview of engineering experimental design and analysis with emphasis on statistical methods; practical and proper statistical methods applicable to multidisciplinary, real-world civil and environmental engineering problems.

CEE 810. Structural Dynamics. 3 Credits.
Lecture 3 hours; 3 credits. Free and forced vibration of discrete and continuous systems; elastic and inelastic response of structures under dynamic loads.

CEE 811. Finite Element Analysis. 3 Credits.
Lecture 3 hours; 3 credits. To provide an understanding of the finite element method (FEM) as derived from an integral formulation perspective. To demonstrate the solutions of (1-D and 2-D) continuum mechanics problems such as solid mechanics, fluid mechanics and heat transfer.

CEE 812. Advanced Reinforced Concrete. 3 Credits.
Lecture 3 hours; 3 credits. Ultimate-strength theory, yield line methods, limit design, and other relevant advanced topics in the theory and design of concrete structures.

CEE 813. Prestressed Concrete. 3 Credits.
Lecture 3 hours; 3 credits. Analysis and design of prestressed concrete members and structures. Shrinkage, creep and losses, shear, bond and anchorages are discussed.

CEE 814. Advanced Structural Analysis. 3 Credits.
Lecture 3 hours; 3 credits. Elastic analysis of framed structures using matrix and numerical techniques.

CEE 815. Engineering Optimization I. 3 Credits.
Lecture 3 hours; 3 credits. Formulation and solution algorithms for Linear Programming (LP) problems. Unconstrained and constrained nonlinear programming (NLP) problems. Optimum solution for practical engineering systems. (Cross-listed with ME 715/815.).

CEE 817. Bridge Structures Design. 3 Credits.
Lecture 3 hours; 3 credits. Design of steel, concrete, and composite bridges using modern techniques and current specifications.

CEE 819. Inelastic Structures. 3 Credits.
Lecture 3 hours; 3 credits. Inelastic analysis and behavior of framed structures.

CEE 820. Structural Stability. 3 Credits.
Lecture 3 hours; 3 credits. Fundamentals of elastic and inelastic stability of beams, columns and frames.

CEE 821. Plates. 3 Credits.
Lecture 3 hours; 3 credits. Classical and modern methods for the solution of plates of various shapes and boundary conditions, continuous and axially loaded plates and plates on elastic supports. Design examples.

CEE 822. Cluster Parallel Computing. 3 Credits.
Lecture 3 hours; 3 credits. Detailed numerical step-by-step procedures to exploit parallel and sparse computation under MPI (Message, Passing, Interface) computer environments are explained. Large-scale engineering/science applications are emphasized. Simultaneous linear equations are discussed.

CEE 823. Seismic Design of Steel Structures. 3 Credits.
Lecture 3 hours; 3 credits. Analysis and design of steel structures under seismic loading conditions, introduction to design specifications for steel structures.

CEE 824. Retrofitting Methods for Bridges and Buildings. 3 Credits.
Retrofitting methods for bridges and buildings combined with related advanced structural analysis and design techniques.

CEE 830. Advanced Foundation Engineering. 3 Credits.
Lecture 3 hours; 3 credits. Advanced analysis and design of shallow and deep foundations and retaining structures.

CEE 831. Advanced Soil Mechanics. 3 Credits.
Lecture 3 hours; 3 credits. Detailed study of shear strength of soils and its application to slope stability and embankment design and analysis. Advanced laboratory shear tests are included.

CEE 832. Engineering Behavior of Soils. 3 Credits.
Lecture 3 hours; 3 credits. Detailed study of physiochemical behavior of soils, fabric, rheology, effective stress path, and their applications to various geotechnical engineering problems.

CEE 833. Soil Dynamics. 3 Credits.
Lecture 3 hours; 3 credits. Study of soil behavior under dynamic loadings. Laboratory and field techniques for determining soil properties and liquefaction potential. Design examples.

CEE 841. Open Channel Flow. 3 Credits.
Lecture 3 hours; 3 credits. Momentum and energy principles, design of open channels, use of mathematical models for flow calculations in rivers, introduction to unsteady open channel flow.

CEE 847. Groundwater Flow. 3 Credits.
Lecture 3 hours; 3 credits. Mathematical formulations of laws governing groundwater flow and contaminant transport. Unsaturated flow. Use of computer models for modeling groundwater aquifers.

CEE 851. Physiochemical Treatment Processes. 3 Credits.
Lecture 3 hours; 3 credits. Physical and chemical processes used in the treatment of water and waste water are covered. Separation, isolation and reaction processes are characterized as well as reactor engineering.

CEE 852. Biological Wastewater Treatment. 3 Credits.
Lecture 3 hours; 3 credits. The use of microorganisms to treat domestic and industrial waste waters for organisms and nutrient removal are studied. Characteristics of individual waste water components and the appropriate treatment processes to remove these components are covered.
CEE 853. Advanced Processes for Water and Wastewater Treatment. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: CEE 751 and 752. Theory, operation and application of advanced water and waste water treatment systems, including land application, dissolved solids, organic contaminant and nutrient removal processes. Emphasis on system development for waste water reclamation/recycling.

CEE 854. Environmental Engineering Microbiology. 3 Credits.
Lecture 2 hours; laboratory 2 hours; 3 credits. A lecture and laboratory course dealing with the theory and applications of microbiology in waste water treatment, water treatment, stream self-purification and their effects in environmental engineering.

CEE 855. Water Quality Management. 3 Credits.
Lecture 3 hours; 3 credits. Characterization of water quality in natural systems and the human activities that result in contaminant input to these systems are studied. Management practices for minimizing contaminant input and for restoring contaminated waters are discussed.

CEE 856. Water Quality Modeling. 3 Credits.
Lecture 3 hours; 3 credits. Formulation of mathematical equations to describe the fate and transport of aqueous contaminants in dynamic surface water systems. Use of water quality computer models to predict various contamination scenarios.

CEE 861. Water Resources Processes and Analysis Methods. 3 Credits.
Interactive hydrologic processes in water resource; modifications of climate change to these processes; modern simulation and systematic analysis methods incorporating the modifications into practices of water resource planning, utilization, protection, and engineering.

CEE 862. Aquatic Chemistry in Environmental Engineering. 3 Credits.
Lecture 3 hours; 3 credits. Chemical reactions in natural and engineered systems are studied with emphasis placed on developing kinetic expressions and assessing chemical equilibrium. Kinetic and equilibrium expressions are applied to engineering problems to predict the reaction time and products of specific reactions.

CEE 870. Transportation Safety. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on major transportation safety issues including transportation safety goals, safety of various transportation modes, identification of problematic locations, selection of safety countermeasures and their evaluation, safety data and modeling issues.

CEE 871. Transportation Operations II. 3 Credits.
Lecture 3 hours; 3 credits. This is the second course in transportation operations and traffic flow theory. Topics covered include design of progressive signal systems, queuing theory, car following models, and applications of microscopic traffic simulation to corridor studies.

CEE 872. Intelligent Transportation Systems. 3 Credits.
Lecture 3 hours; 3 credits. This course examines how ITS can be used to enhance mobility and safety. The topics covered in the course include systems engineering approach to ITS, traveler response to technologies and information, ITS planning and evaluation, and ITS deployment and operational performance.

CEE 874. Transportation Planning. 3 Credits.
Lecture 3 hours; 3 credits. This course covers transportation planning processes that include policy direction, transportation data, travel demand forecasting models, and decision-making/stakeholders issues.

CEE 875. Transportation Network Models and Optimization. 3 Credits.
Lecture 3 hours; 3 credits. This course is designed to show the broad applicability of network modeling techniques to the problems of designing and operating various transportation systems. Topics to be covered include fundamentals of graph theory, routing algorithm network flow problems, assignment and matching problems, facility location problems, and relevant optimization techniques.

CEE 876. Simulation in Transportation Networks. 3 Credits.

CEE 882. Design of Coastal Structures. 3 Credits.
Lecture 3 hours; 3 credits. Nonlinear wave theories; wave forces on slender piles and seawalls; design of rubble mound structures; design philosophy, initial costs, maintenance costs, optimized design using stochastic methods; design of renourished beaches. Advanced alternative solutions for shore protection.

CEE 887. Dredging and Beach Engineering. 3 Credits.
Lecture 3 hours; 3 credits. Types of dredges, factors affecting dredge performance; hydraulic dredges (cutter, hopper) and mechanical dredges systems (bucket, clamshell, etc.); shoaling rate determination; inlet sand bypassing systems; beach renourishment schemes. Design of beach renourishment/projects.

CEE 888. Coastal Hydrodynamics and Sediment Transport Processes. 3 Credits.
Lecture 3 hours; 3 credits. Time averaging wind waves and radiation stresses. Wave setup, longshore currents, rip currents and nearshore circulation. Theoretical models for regular (monochromatic) and irregular waves. Wave energy dissipation models in surf zones. Vertical structure and undertow models. Sediment concentration and transport models for predicting bathymetric change.

CHEM - Chemistry And Biochemistry

CHEMISTRY AND BIOCHEMISTRY Courses

CHEM 515. Intermediate Organic Chemistry. 3 Credits.
Lecture 3 hours; 3 credits. An in-depth treatment of the chemistry of carbon compounds, including reaction mechanisms, spectral techniques, polymerization, pericyclic reactions, and biomolecules.
CHEM 521. Instrumental Analysis Lecture. 3 Credits.
Lecture 3 hours; 3 credits. Designed to be taken concurrently with CHEM 522. A study of the basic principles of spectroscopic, chromatographic, and electrochemical methods of quantitative chemical analysis. Methods of chemical instrumentation are also included.

CHEM 522. Instrumental Analysis Laboratory. 3 Credits.
Laboratory 6 hours; 3 credits. Pre- or co-requisite: CHEM 521 with a grade of C or better. An intensive laboratory study of the principles of analytical chemistry. Experiments in spectroscopic, chromatographic, and electrochemical methods are conducted to illustrate fundamental principles and to provide the opportunity to develop skills in the use of instrumentation for chemical measurement.

CHEM 541. Biochemistry Lecture. 3 Credits.
Lecture 3 hours; 3 credits. This course is a one-semester survey of the major molecular constituents, bioenergetics, enzymes, nucleic acid structure, and genetic information transfer pathways fundamental to biochemistry.

CHEM 542. Biochemistry Laboratory. 4 Credits.
Lecture 1 hour; laboratory 6 hours; 4 credits. Prerequisite or corequisite: CHEM 541 with a grade of C or better. Principles and techniques of biochemical and immunological procedures involving protein characterization and isolation, enzymology, bioinformatics, and common molecular biology techniques for nucleic acids will be presented. (This is a writing intensive course.).

CHEM 543. Intermediate Biochemistry. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: CHEM 541 with a grade of C or better or equivalent. This course presents and in-depth study of protein structure, folding, and synthesis. The major metabolic pathways will be studied in detail regarding thermodynamics and mechanism of regulation or control of individual enzymes and entire metabolic pathways. Concepts of metabolic disease will be introduced and effects on integrated metabolism will be presented.

CHEM 551. Advanced Inorganic Chemistry. 3 Credits.
Lecture 3 hours; 3 credits. Theoretical aspects of modern inorganic chemistry: bonding theories, stereochemistry, acid-base theories, coordination compounds, organometallic and bioinorganic compounds.

CHEM 552. Advanced Inorganic Chemistry Laboratory. 2 Credits.
Laboratory 4 hours; 2 credits. Prerequisite: CHEM 551 with a grade of C or better. Advanced topics in inorganic synthesis.

CHEM 553. Essentials of Toxicology. 3 Credits.
Lecture 3 hours; 3 credits. Fundamental principles of toxicology: dose-response relationship, toxicologic testing, chemical and biological factors influencing toxicity, organ toxicity, carcinogenesis, mutagenesis, teratogenesis.

CHEM 560. Frontiers in Nanoscience and Nanotechnology. 1 Credit.
Lecture 1 hour; 1 credit. Nanotechnology presents unparalleled opportunities for advances in technology and medicine. Simultaneously, nanotechnology presents new challenges to organisms and to our environment. These undefined risk factors threaten to slow the development of new technologies and novel medical therapies. This course will review: structure, synthesis and properties of key nanomaterials; key applications of nanomaterials in technology and medicine; and impacts of nanomaterials on plant and animal physiology and the environment more generally. This course will be team-taught by faculty members in Biological Sciences, Chemistry and Biochemistry, and Engineering.

CHEM 669. In-Service Practicum. 3-6 Credits.
6 credits; 50 hours per credit. Prerequisites: CHEM 631 632. One semester of work experience in local hospital, forensic, or industrial laboratory. Available for pass/fail grading only.

CHEM 670. Graduate Orientation. 3 Credits.
Lecture, 3 hours; 3 credits. An introduction to graduate studies in chemistry. Topics include responsible conduct of research (RCR), grant writing skills, oral presentation of chemical research and methods for searching the chemical literature. Attendance at departmental seminars is required. Limited to first-year chemistry doctoral students.

CHEM 685. Frontiers in Chemistry. 1-3 Credits.
1-3 credits each semester. Prerequisite: permission of the department chair. Topics representing the most recent advances in various fields of chemistry or ones which represent an interdisciplinary advancement.

CHEM 690. Seminar. 1 Credit.
1 credit. Master’s students attend seminars given by researchers from across the country in order to expose them to additional areas of research in chemistry and biochemistry.

CHEM 691. Master’s Seminar. 2 Credits.
2 credits. Master’s students attend seminars; attend a class on giving seminars; and present a seminar on their own research.

CHEM 695. Topics in Chemistry. 1-3 Credits.
1-3 credits each semester. Prerequisite: permission of the department chair.

CHEM 698. Master’s Research. 1-9 Credits.

CHEM 699. Master’s Thesis. 3 Credits.

CHEM 701. Advanced Analytical Chemistry. 3 Credits.
Lecture, 3 hours; 3 credits. The theoretical and practical foundation of analysis with emphasis on recent analytical developments and current literature; topics may include figures of merit and data treatment, sampling and extraction, HPLC, electrochemistry, circular dichroism, FT-IR, Raman, MS, electrophoresis and NMR. Lectures are given by experts in those techniques.

CHEM 702. Advanced Analytical Chemistry II. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisites: Instrumental Analysis (or its equivalent). This course will review the most cutting-edge Advances Analytical Chemistry Instrumentation and Methods, spanning over three core areas of analytical chemistry (Spectroscopy, Separation and Electrochemistry) and offer the in depth understanding of objectives, motivations, and future directions of Advanced Analytical Chemistry Instrumentation. The course will focus on advanced instrumentation and methodologies that can achieve ultra sensitive analysis and detection, including single molecular spectroscopy, nanoparticle probes, high-speed separation in microfluidic devices, ulramicroelectrodes for sensing and imaging.

CHEM 703. Chromatographic Separations by HPLC and GC. 3 Credits.
Lecture 3 hours; 3 credits. This course covers basic principles of chromatography emphasizing high performance liquid chromatography (HPLC) and gas chromatography (GC), as well as separation modes, instrumentation, detection methods, quantification, and sample preparation including solid phase extraction. Examples from environmental sciences, biosciences and industry will be stressed.

CHEM 704. HPLC and GC Laboratory. 2,3 Credits.
Laboratory 4 or 6 hours; 2 or 3 credits. Corequisite: CHEM 703. This lab course consists of six to seven independent HPLC and GC exercises based on examples from environmental, bioscience, and industrial applications.

CHEM 715. Automation and Management of the Clinical Chemistry Laboratory. 1 Credit.
Lecture 1 hour; 1 credit. Prerequisite: CHEM 631 or permission of the instructor. The basic principles of management of the clinical chemistry laboratory and regulatory issues in laboratory management are presented.

CHEM 716. Electrochemical Methods of Analysis. 1,2 Credit.
2 credits. This course presents the fundamental principals and practical applications of modern electrochemical methods of analysis. Lectures and text readings cover the basic concepts and fundamental principals of this division of analytical techniques. Detailed descriptions and demonstrations of modern electrochemical research instrumentation will be provided. Students will obtain hands-on experience with this instrumentation by performing a required chemical determination using an electroanalytical method, and by undertaking a special analytical project. Research applications of other electroanalytical techniques and instrumentation, in addition to those actually used by the students in this course, will be discussed and/or demonstrated.
CHEM 720. Experimental Design and Data Treatment. 3 Credits.
Lecture 3 hours; 3 credits. A hands-on approach to experimental design and multivariate data analysis. Modern computer-based chemometric theories will be presented.

CHEM 722. Bonding and Group Theory. 3 Credits.
3 credits. Introduction to group theory and application to problems in bonding and spectroscopy.

CHEM 723. Modern Synthetic Organic Chemistry. 3 Credits.
Design of complex organic molecules. Topics covered will include: retrosynthetic analysis, stereochemical control and contemporary methods. Prerequisite: CHEM 415 or CHEM 515 or a pass in the organic placement exam.

CHEM 724. Bioinorganic Chemistry. 3 Credits.
3 credits. This course is a survey of the mechanisms of biochemical activity of the trace elements. Topics include oxygen uptake, oxidation-reduction, metabolism, and toxicity.

CHEM 725. Physical Organic Chemistry. 3 Credits.
Lecture 3 hours; 3 credits. Approaches to the study of reaction mechanisms, including molecular orbital theory, thermochemistry, kinetics, isotop effects, solvent and substituent effects (including linear free energy relationships), acidity, acid catalysis, and detection of reactive intermediates.

CHEM 726. Medicinal Chemistry. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: CHEM 721 or permission of the instructor. Study of the chemistry and mode of action of various medicinal and physiologically active compounds.

CHEM 734. Organic Spectroscopy. 3 Credits.
3 credits. Organic functional group and structure analysis with ultraviolet, infrared, nuclear magnetic resonance, mass, and other spectroscopic techniques.

CHEM 736. Introduction to Organic Synthesis. 3 Credits.
3 credits. Detailed coverage of fundamental organic transformations with emphasis on reduction, oxidation, carbon-carbon bond formation, and protecting group strategy.

CHEM 741. Stable Isotope Chemistry. 3 Credits.
Lecture 3 hours; 3 credits. This course investigates the stable isotope systematics of carbon, nitrogen, hydrogen, oxygen and sulfur in biological, chemical and geological systems. Course material includes analytical methods, fractionations and applications of stable isotope analyses in a wide range of natural systems. Recommended to graduate students in chemistry, earth sciences and biological sciences with an interest in environmental processes.

CHEM 742. Advanced Mass Spectroscopy. 3 Credits.
3 credits. Prerequisites: CHEM 423/523. This course trains students in the theory and application of advanced mass spectrometric methods as used in all subdisciplines of chemistry and biochemistry.

CHEM 743. Organic Geochemistry. 3 Credits.
Lecture 3 hours; 3 credits. Organic geochemistry is the study of organic compounds originally produced by photosynthesis and altered as they cycle through the soils, atmosphere, rivers, oceans, and crustal rocks. This course will include the carbon/oxygen cycles, biomarkers, organic matter diagenesis/catagenesis, analytical techniques used in organic geochemistry, and an introduction to carbon isotopes.

CHEM 744. NMR Spectroscopy. 3 Credits.
3 credits. This course presents the basics of NMR spectroscopy. Topics include basic NMR theory, NMR instrumentation, one- and two-dimensional 1H and 13C techniques, and introduction to solid-state NMR.

CHEM 748. Environmental Chemistry Laboratory. 3 Credits.
Laboratory 6 hours; 3 credits. Study of the basic principles and methods of trace chemical analysis of environmental systems, including spectrophotometric, chromatographic, and electrochemical instrumental methods, in addition to wet chemical methods.

CHEM 749. Environmental Chemistry. 3 Credits.
Lecture 3 hours; 3 credits. An overview of the natural chemistry systems operating in the atmosphere, in the terrestrial environment (both water and soils), and in the oceans, and the potential effects that human activities may have on them. Specific topics include the origin and evolution of the earth and life, the chemistry of the atmosphere (including the ozone layer and greenhouse effect), the organic and inorganic components of soil and water, chemical weathering of rocks, metal complexation, biological processes in soil and water, and global-scale chemical processes.

CHEM 754. Quantum Chemistry. 3 Credits.
Lecture, 3 hours; 3 credits. Overview of the development and application of quantum mechanics from a chemical perspective.

CHEM 755. Computational Chemistry. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: CHEM 754 or permission of the instructor. Comprehensive overview of ab initio (quantum) calculations and molecular dynamic simulations, the two most widely used computational methods. Plus a brief overview of other computational applications in chemistry and biology.

CHEM 756. Inorganic Reaction Mechanisms. 3 Credits.
3 credits. This course is a survey of the major mechanisms of inorganic and organometallic chemistry. Topics include kinetics, ligand substitution, electron transfer, and photochemistry.

CHEM 757. Organic Chemistry Mechanisms. 3 Credits.
3 credits. Prerequisites: CHEM 725/825. The application of physical organic techniques to study the mechanisms of key organic reactions and the structures of reaction intermediates. Includes photochemistry and pericyclic reactions.

CHEM 760. Molecular Spectroscopy. 3 Credits.
An introductory survey of the rotational, vibrational and electronic spectroscopy of molecules from the perspective of quantum mechanics and group theory. Prerequisite: CHEM 333.

CHEM 762. Advanced Techniques in Biochemistry. 1-3 Credits.
Laboratory 2-6 hours; 1-3 credits. A laboratory course in modern experimental methodology and instrumentation in biochemistry.

CHEM 765. Advanced Biochemistry. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Topics will include: macromolecular structure, function, thermodynamic stability and folding kinetics; protein chemistry; molecular biology; molecular mechanisms of disease and bioinformatics.

CHEM 767. Enzymology. 3 Credits.
Lecture 3 hours; 3 credits. Consideration of experimental methods for examining the kinetic data and rate equations from enzymes, examination of various models of enzyme catalysis, comprehensive presentation of the mechanisms of coenzyme action, and studies of mechanism of enzyme action.

CHEM 769. Nucleic Acids Biochemistry. 3 Credits.
Lecture 3 hours; 3 credits. A comprehensive presentation of the chemistry of RNA and DNA. Modern concepts of gene regulation, the control over transcription, RNA processing and translation, cell cycle control and molecular carcinogenesis.

CHEM 775. Physical Biochemistry. 3 Credits.
Lecture 3 hours; 3 credits. Physical characterization of macromolecules, polarized light, absorption and fluorescence, sedimentation and transport hydrodynamics, electrophoretic mobility, light scattering, and structural x-ray crystallography of proteins and nucleic acids.

CHEM 779. Kinetics and Thermodynamics. 3 Credits.
Lecture 3 hours; 3 credits. A survey of modern theories of reaction rates and mechanisms, classic thermodynamic functions, and an introduction to statistical thermodynamics.

CHEM 795. Selected Topics in Chemistry and Biochemistry. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: permission of the instructor. Thorough coverage of areas selected to meet special needs and interests.
CHEM 814. Biomedical Sciences Laboratory. 2 Credits.
2 credits each semester. With approval of the program director.

CHEM 815. Biomedical Sciences Laboratory. 2 Credits.
2 credits each semester. With approval of the program director.

CHEM 816. Electrochemical Methods of Analysis. 1,2 Credit.
2 credits. This course presents the fundamental principals and practical applications of modern electrochemical methods of analysis. Lectures and text readings cover the basic concepts and fundamental principals of this division of analytical techniques. Detailed descriptions and demonstrations of modern electrochemical research instrumentation will be provided. Students will obtain hands-on experience with this instrumentation by performing a required chemical determination using an electroanalytical method, and by undertaking a special analytical project. Research applications of other electroanalytical techniques and instrumentation, in addition to those actually used by the students in this course, will be discussed and/or demonstrated.

CHEM 822. Bonding and Group Theory. 3 Credits.
3 credits. Introduction to group theory and application to problems in bonding and spectroscopy.

CHEM 824. Bioinorganic Chemistry. 3 Credits.
3 credits. This course is a survey of the mechanisms of biochemical activity of the trace elements. Topics include oxygen uptake, oxidation-reduction, metabolism, and toxicity.

CHEM 834. Organic Spectroscopy. 3 Credits.
3 credits. Organic functional group and structure analysis with ultraviolet, infrared, nuclear magnetic resonance, mass, and other spectroscopic techniques.

CHEM 836. Introduction to Organic Synthesis. 3 Credits.
3 credits. Detailed coverage of fundamental organic transformations with emphasis on reduction, oxidation, carbon-carbon bond formation, and protecting group strategy.

CHEM 842. Advanced Mass Spectroscopy. 3 Credits.
3 credits. This course trains students in the theory and application of advanced mass spectrometric methods as used in all subdisciplines of chemistry and biochemistry.

CHEM 844. NMR Spectroscopy. 3 Credits.
3 credits. This course presents the basics of NMR spectroscopy. Topics include basic NMR theory, NMR instrumentation, one- and two-dimensional 1H and 13C techniques, and introduction to solid-state NMR.

CHEM 856. Inorganic Reaction Mechanisms. 3 Credits.
3 credits. This course is a survey of the major mechanisms of inorganic and organometallic chemistry. Topics include kinetics, ligand substitution, electron transfer, and photochemistry.

CHEM 857. Organic Chemistry Mechanisms. 3 Credits.
3 credits. Prerequisites: CHEM 725/825. The application of physical organic techniques to study the mechanisms of key organic reactions and the structures of reaction intermediates. Includes photochemistry and pericyclic reactions.

CHEM 862. Advanced Techniques in Biochemistry. 1-3 Credits.
Laboratory 2-6 hours; 1-3 credits. A laboratory course in modern experimental methodology and instrumentation in biochemistry.

CHEM 890. Chemistry Seminar. 1 Credit.
1 credit. Students attend seminars given by researchers from across the country on order to expose them to additional areas of research in chemistry and biochemistry.

CHEM 891. Doctoral Seminar. 2 Credits.
2 credits. Students attend seminars; attend a class on giving seminars; and present a seminar on their own research.

CHEM 895. Intern in Clinical Laboratory Management. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits each semester. Lecture and discussion of recent advances in the field of biomedical sciences.

CHEM 898. Doctoral Research. 1-9 Credits.

CHEM 899. Dissertation. 1-9 Credits.

CHEM 999. Chemistry 999. 1 Credit.
1 credit. A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

CHP - Community Health Professions

COMMUNITY HEALTH PROFESSIONS Courses

CHP 500. Ethics in Health Administration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of the instructor. A survey of philosophical problems common to health sciences, including an analysis of the nature of health in its historical and contemporary contexts.

CHP 515. Critical Issues in Public/Community Health Administration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Permission of the instructor. Identification and analyses of critical issues currently facing public/community health and the American health care system. (This is a writing intensive course.).

CHP 520. Foundations of Gerontology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of instructor. Focuses on changes in the characteristics, status, and roles of the elderly; personality development, mental health, and adjustment of individuals with emphasis on biophysical and psychosocial processes as they influence capacity and performance in the elderly.

CHP 525. Health Aspects of Aging. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: CHP 520 or permission of the instructor. Identifies major issues and problems in meeting health care needs of the aged. Emphasis on role of social assets and supports in determining effects of life changes on the aging process.

CHP 526. Skills in Health Services Administration I. 1-3 Credits.
Lecture 2 hours; 1 hour web; 1-3 credits. Prerequisite: permission of instructor. Introduction of basic concepts which will allow for development of critical skills in a variety of managerial areas pertinent to the delivery of health care.

CHP 527. Skills in Health Services Administration II. 1-3 Credits.
Lecture 2 hours; 1 hour web; 1-3 credits. Prerequisite: permission of instructor. Continuation of basic concepts and development of critical management skills pertinent to the delivery of health care. Experts in various fields will provide students with useful strategies in the administration of health care services.

CHP 530. Community Health Resources and Health Promotion. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of instructor. Designed to provide information about community health resources.

CHP 540. Finance and Budgeting in Healthcare. 3 Credits.
3 hours lecture. This course covers financial management functions in healthcare organizations including operating and capital budgeting processes along with budgeting and financial controls.

CHP 545. Health Services Research. 3 Credits.
This course focuses on health services research and its assessment abilities and application in health care. Topics include the use of EXCEL, SAS, and SPSS to analyze data. An exploration of the issues and challenges of health services research for health related organizations and other organizations. Statistical procedures and practices will also be conducted. Prerequisite: STAT 130M.
CHP 550. Public and Community Health Administration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of instructor. A review of the principles and practice of administering public and community health organizations and programs at federal, state, and local levels. Constitutional, statutory and administrative bases for organizing and conducting public/community health programs will be discussed.

CHP 555. Interpersonal and Counseling Skills for Health Professionals. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of instructor. Study and practice in human relations for health practitioners. The course is designed to incorporate the latest and best techniques from the health sciences with a “therapeutic use of self.”.

CHP 556. Substance Use and Abuse. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of instructor. Focuses on facts about drugs and drug abuse, on value judgments concerning drugs, and on interaction of facts and value judgments. Emphasis is on drug abuse prevention.

CHP 561. Managerial Epidemiology. 3 Credits.
This course will blend theory and application of epidemiology. This course will also provide a comprehensive introduction to epidemiology and explain how to use epidemiological concepts and tools to improve decisions about the management of health services. Prerequisite: CHP 200.

CHP 565. Policy and Politics of Health. 3 Credits.
Lecture 3 hours; 3 credits. This course will explore both health policy and the politics of health. Students will develop an understanding of the systematic and analytical framework for developing health and health care policy issues.

CHP 570. Death, Dying and Survivorship. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of instructor. Utilizes readings from sociology, psychology, literature, art, law, religion, and the medical and nursing sciences to explore death in its personal, cultural and professional significance. Audiovisual presentations and guest speakers will provoke thought and discussion to allow students to come to terms with their attitudes toward death and assist others in dealing with this important life experience.

CHP 575. Healthcare Marketing. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of the instructor. This course provides a basic understanding of marketing in a health care setting. This course will cover the following: the history of marketing in a health care setting, health care markets, marketing techniques, and leadership skills in managing and supporting the marketing efforts.

CHP 580. Health Ethics and the Law. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of instructor. This course provides the students with a basic knowledge of health law and examines legal issues confronting health services administrators in various health care environments.

CHP 585. Health Informatics. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on healthcare informatics (information systems) and application in health care organizations. It provides an overview of health information system concepts, management, and integration of technology in healthcare organizations.

CHP 595. Topics in Public/Community Health Administration. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor. This course provides the opportunity for the study of selected topics in public/community health, including informatics, under the supervision of a faculty member.

CHP 596. Topics in Public/Community Health Administration. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor. This course provides the opportunity for the study of selected topics in public/community health, including informatics, under the supervision of a faculty member.

CHP 597. Readings in Public/Community Health Administration. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor. This course provides the opportunity for advanced investigations of selected issues/concerns in public/community health administration, under the supervision of a faculty member. It must be taken by students who wish to pursue topics not covered by regularly scheduled courses.

CHP 600. Principles of Community Health. 3 Credits.
The course will provide an introduction to the relationship between health status, the current multifaceted delivery system and the social and political aspects of the community. Topics of this course include community health education, sanitation, mental health, maternal and child health, and others.

CHP 601. Research Design and Evaluation in the Health Professions. 3 Credits.
This course is designed for graduate students in the health professions to explore the concepts, problems, needs, and issues in both conducting research and evaluation and in analysis of research related to the health professions. An understanding of statistics is strongly advised.

CHP 602. Principles of Environmental Health Science and Protection. 3 Credits.
An introduction to the chemical, physical and biological factors affecting human health and well being. The emphasis is on the application of controls to prevent disease and maximize environmental quality. (Cross-listed with ENVH 600).

CHP 611. Social and Cultural Aspects of Public Health and Illness. 3 Credits.
Scholars will gain an understanding of social and cultural issues associated with public health and illness through discussion, application of principles and theories and an interactive case study. Scholars will identify personal and social influences on public health and discuss health disparities and community health needs. Special attention will be paid to populations bound by shared risks and behaviors.

CHP 630. Health Care Marketing. 3 Credits.
This course is devoted to exploring the fundamentals of marketing as they relate to the health care environment. Emphasis will be placed on marketing of new programs, including health-promotion programs. It provides a survey of marketing activities as they relate to the health care environment.

CHP 633. Financing Health Care. 3 Credits.
Students will examine financial evaluation of the health care industry, the source of funds, and the effects of changing patient policies. Other topics of interest will be financial strategies, budgets, and capital outlay. (Cross-listed with MPH 733).

CHP 635. Managed Care. 3 Credits.
This course provides the student all the basic information needed to learn critical concepts of managed care. It explores topics ranging from the roots of managed care to types of managed care organizations, negotiating and contracting for services, controlling utilization and using data reports in the management of managed care organizations. In addition, the course addresses the future of managed care in the turbulent, dynamic health care environment.

CHP 637. Issues In Health Care Administration. 3 Credits.
This course explores current issues/trends faced by health care/institutions in the constantly evolving health care environment. Topics such as the impact of shift in service delivery from inpatient to outpatient care, development of multihospital systems and hospital alliances, prospective payment systems, retrospective payment systems and many other critical issues will be addressed.

CHP 640. Statistical Reasoning for the Health Professions. 3 Credits.
This course introduces the application of quantitative reasoning through the use of fundamental concepts in statistics and quantitative analyses in health care. Main topics include univariate, bivariate and multivariate procedures appropriate with parametric and non-parametric data. Related topics include: sampling distribution, statistical inference, and hypothesis testing.
CHP 646. Epidemiology, 3 Credits.
This course examines epidemiology as a method for viewing inborn community health problems and as a body of knowledge derived from this method. Skills in using epidemiology as a method and as knowledge to solve community health problems will be included.

CHP 651. Public and Community Health Administration, 3 Credits.
A review of the principles and practice of administering public and community health organizations and programs at federal, state and local levels. Constitutional, statutory and administrative bases for organizing and conducting public and community health programs will be discussed.

CHP 669. Practicum, 1-6 Credits.
Field experience. The student is provided an opportunity to apply academic philosophy, theory, and principle during a period of supervised practice.

CHP 690. MSCH Comprehensive Exam. 0 Credits.
The Master of Science in Community Health Comprehensive Examination offers the student an opportunity to synthesize the learning experience of the graduate program and demonstrate mastery of program outcomes. The student must receive a grade of pass on the comprehensive exam to successfully complete the MSCH degree.

CHP 695. Topics in Community Health. 1-3 Credits.
This course provides the opportunity for the study of selected topics in community health, under the supervision of a faculty member. Prerequisites: permission of the instructor.

CHP 697. Readings in Community Health. 1-3 Credits.
This course provides an opportunity for advanced investigations of selected issues/concerns/trends in community health, under the supervision of a faculty member. It may be taken by students who wish to pursue topics not covered by regularly scheduled courses Prerequisites: permission of the instructor.

CHP 698. Thesis Research. 1-6 Credits.
Devoted to research, writing of the thesis and scheduled conferences with the candidate’s advisor and thesis committee. Student must submit an acceptable written thesis demonstrating knowledge of problem selection, data classification, analysis and interpretation and defend it.

CHP 699. Thesis Research. 1-6 Credits.
Devoted to research, writing of the thesis.

CHP 711. Health Care Research, 3 Credits.
This course is a conceptual approach to selection and application of univariate, bivariate and multivariate statistical techniques in health research. Emphasis is placed on handling large data sets and the use of a computer for manipulation of quantitative data.

CHP 715. Decision Analysis in Health Care. 3 Credits.
This course is a conceptual approach and teaches students the art and science of decision making. It covers expected utility theory, decision tree analysis, cost-benefit analysis, and the psychological aspects of the decision-making process in the context of health policy research. (cross listed with HLSC 815).

CHP 720. Health Care Delivery Systems. 3 Credits.
This course provides the student with an opportunity to analyze the American health-care system. Like any other system in our society, the health care system is composed of complex organizational dynamics and structures which predicate the interaction between the major components of the system: personnel who provide service; institutions in which care is provided; financing mechanisms that pay for care; and the government which attempts to regulate it. This course is designed for in-depth analysis and synthesis of all aspects of health care delivery with an emphasis on improving the delivery and access to care.

CHP 750. Educational Processes for the Health Professional, 3 Credits.
The teaching/learning process is the focus of this course for application to the many teaching roles which the health professional faces. The course is designed to meet the needs of the health professional in the areas of patient instruction, educational programs, and continuing education. The course is designed to assist students in identifying and gaining proficiency in the application of a variety of skills utilized by the health professional in designing, organizing, coordinating and evaluating health-education programs.

CHP 764. Health Economics, 3 Credits.
This course introduces economic analysis in health, health care, and health policy. It aims to provide the background of using economic approaches to understand the behaviors of consumers, producers, and insurers in the health care market. Main topics include economic determinants of health, supply and demand for medical care and insurance.

CHP 772. Policy and Politics of Health, 3 Credits.
The course enables the student to develop a systematic and analytical framework for understanding health care policy issues. The policy process is covered in detail. Timely policy issues are also discussed.

CHP 773. Developing Grants and Contracts in Health Professions. 3 Credits.
Designed as a "hands-on" approach in effective grantmanship, this course will guide the student from the identification of potential funding sources through proposal development. Highlights include program planning, nonprofit status, governmental/foundation corporate trends, local resources and grants administration.

CHP 775. Comprehensive Health Planning. 3 Credits.

CHP 787. Legal Aspects of Health Services. 3 Credits.
This course covers legal aspects related to health services, including regulatory processes and implementation, and policy choices.

CHP 795. Topics. 1-3 Credits.
Designed to provide the student with an opportunity to study independently or in small groups and investigate specific topics of current interest in the health services.

CHP 999. Community Health Professions 999. 1 Credit.
A one-hour pass/fail registration required of graduate students to maintain active status during the final semester prior to graduation.

COMM - Communications

COMMUNICATIONS Courses

COMM 500. Intercultural Communication. 3 Credits.
This course is designed to introduce students to the study of communication in cultural contexts, the purpose of which is to prepare students to live and work within an increasingly multicultural world. This is accomplished by first defining and critically analyzing concepts of culture. Throughout the semester, the course will investigate theories of culture and communication that address the development of cultural identity, intercultural communication competence, the role of verbal and nonverbal communication across cultures, the cultural composition of the U.S., and finally ethical communication and challenges in a globalized era. (This is a writing intensive course.).

COMM 501. Communication Theory. 3 Credits.
An overview of general and contextual theories of communication. Focus is on the nature of communication theory, the role of theory in communication inquiry, and the relationships among theory, research, and practice.

COMM 503. Public Relations and Crisis Communications. 3 Credits.
This course introduces students to the basic elements of public relations as it pertains to assisting organizations avoid, mitigate and recover from crisis situations. Students will have the opportunity to both observe and participate in crisis communications situations.
COMM 505. Communication and Culture in the Middle East. 3 Credits.
The course examines the tensions between modernity and tradition in the
culture. The course examines the individually and family social structures and the use of science and technology.

COMM 507. Communication and Culture in Asia. 3 Credits.
This course provides theoretical models for examining the values, communication patterns and cultural perspectives of the peoples of Asia. Films, folklore, newspapers and literature from Asia are investigated.

COMM 512. Interpersonal Communication Theory and Research. 3 Credits.
A survey of classic and contemporary theories and research of
communication in personal and social relationships across the lifespan. Emphasizes communication as a means to facilitate conditions for development of positive relational outcomes. (This is a writing intensive course.)

COMM 521. Communication and Conflict Management. 3 Credits.
Focus on theory and research of communication processes in conflict episodes across social and personal relational contexts. Applications of communication approaches to conflict management are emphasized.

COMM 525. Family Communication Theory and Research. 3 Credits.
A survey of classic and contemporary theories and research of communication in family units, family relationships, and family interfacing with society. The course emphasizes communication in the social construction of evolving “family” realities as well as communication means to facilitate conditions for development of positive domestic outcomes.

COMM 527. Children’s Communication Theory and Research. 3 Credits.
A survey of theories and research of communication during childhood. Emphasis is on children as developing communicators, their relationships, and their interactions with media. Factors affecting optimal development of children’s communication and development of applications to enhance children’s communication development are emphasized.

COMM 534. African-American Rhetoric Voices of Liberation. 3 Credits.
With the goals of examining the rhetorical strategies and their historical context, students will study and critique original speeches and various forms of discourse by African-American speakers.

COMM 543. Hispanic Film. 3 Credits.
Prerequisites: COMM 270A or THEA 270A or permission of instructor. A topical study of the major works of Spanish and Latin American film from Buñuel to the present. The course explores many issues, including those related to gender, race, symbolism, and class struggle.

COMM 544. German Cinema. 3 Credits.
This course focuses on the German cinema from perspectives such as fascism and its legacy, film as historical critique, and Weimar cinema.

COMM 545. Communication Analysis and Criticism. 3 Credits.
A survey of the key methods used in critiquing various forms of human and mediated communication for the purpose of becoming more discerning consumers of public mass mediated messages. Analysis will include films, television, and radio programs, advertisements, newspapers, public discourses, speeches, and conversations.

COMM 547. Electronic Media Law and Policy. 3 Credits.
This course focuses on legal and policy issues related to modern media systems and technologies, with an emphasis on legal considerations of electronic media. Subjects include First Amendment issues concerning news, programming, and advertising; station licensing; and challenges to traditional legal thought brought about by new technologies.

COMM 548. Transnational Media Systems. 3 Credits.
An examination of the rise of broadcast technology and world flow of information and entertainment. Theory and policy issues of systems of broadcast ownership, access, regulation, programming, transborder, broadcasting and cultural imperialism and dominance of Western programming will be addressed.

COMM 555. Critical Analysis of Journalism. 3 Credits.
A critical examination of the news industry as practiced in the printed press, network and cable television, magazines, the Internet, and alternative press. Class examines the political economy of journalism, the sociology of journalistic practice, international news flows, ideological/political control of news, and mythological narrative forms within news.

COMM 556. Organizations and Social Influence. 3 Credits.
Focuses on theories, research and applications of the social influence function of communication in a variety of organizational contexts. Examines traditional and nontraditional social influence theories and research as applied to organizational change.

COMM 565. Mass Media and the National Elections. 3 Credits.
Focuses on use of media in presidential elections from 1952 to the present. Topics include image creation and management, and the relationship between media and voting behavior.

COMM 567. Media, Politics and Civic Engagement. 3 Credits.
Focuses on the ways in which citizens develop knowledge of, engage with, and practice politics through mass media and personal media forms. Students examine historical and contemporary practices of civic engagement and political organizing via media such as the alternative press, talk radio, rebel radio, letters-to-the-editor, the Internet, cinematic representations, public access television, and others. Students seek to understand the power available to citizens for political engagement via mediated communication forms.

COMM 568. Communication and Political Symbolism. 3 Credits.
The persistent communication and display of symbols and rituals of political meaning are central to how political power is built and legitimately exercised. This course examines such symbols and rituals by focusing on public rituals such as elections, the State of the Union address, and wars; political symbols such as the American and Confederate flag, Statue of Liberty, and television news; and institutions and practices related to public memory, such as war memorials, historical reenactments, museum and theme park displays, and firm narratives.

COMM 571. International Film History. 3 Credits.
An examination of world cinema as a technology, a business, an institution, and an art form from inception to the present. Emphasis is on the narrative fiction film, its technological and aesthetic development, economic organization, and socio-cultural context. Representative classic and contemporary works will be screened and analyzed.

COMM 572. New Media Topics: Theories and Practices. 3 Credits.
This seminar investigates one or two particular emergent new media practices and theories. The topics will be chosen at the discretion of the instructor but may include such issues as “mobile media,” “micro media and audiences,” and “social media.”

COMM 573. Television and Society. 3 Credits.
The role of television in the cultural, psychological, and economic life of America. The structure and design of television programs; and the history and function of television in reinforcing or altering public perceptions of ideas, events, and people. Major critical approaches are employed in examining television’s social impact and global reach.

COMM 578. Principles of Media Marketing and Promotion. 3 Credits.
Course introduces students to the ways in which different media forms are used for advertising and marketing purposes. Emphasis is on electronic media, though other approaches, such as direct marketing techniques and the increasing use of new media technologies for marketing, are also examined.

COMM 579. American Film History. 3 Credits.
An examination of American motion pictures as an art form, a business and an institution from inception to the present. Primary attention is accorded to the narrative fiction film, its technological and aesthetic development, economic organization and social impact. This course highlights the many connections between film history and American culture.
COMM 580. The Video Documentary II. 3 Credits.
Discussion/presentation topics range from production field work to post-production editing. The final third of the semester will be devoted to compiling the rough footage in post production.

COMM 581. The Documentary Tradition. 3 Credits.
An in-depth investigation of the history and theory of the documentary tradition in film, television, and radio. Examining both American and international examples, the course looks at major schools, movements, goals, and styles of documentary production. Representative texts will be studied for their socio-political influences, persuasive techniques, and aesthetic formulas.

COMM 585. Film and Television Genres. 3 Credits.
This course is designed to examine the conventions and meanings of various film and television genres within their broader aesthetic, socio-historical, cultural, and political contexts. Each time the class is offered it will focus in depth on a different genre, such as the gangster, the Western, the musical, the comedy, science fiction, among others.

COMM 586. Advanced Filmmaking. 3 Credits.
Offers the advanced film/video maker an opportunity to produce a project beyond the scope of previous classroom projects. Students come to the course in production teams (typically 5 members), with each member assigned a specific duty (cinematography, editing, directing, etc.). Students are permitted into the course solely by instructor approval and only after demonstration of superior skills in subordinate courses and acceptance of a submitted screenplay. Prerequisites: Permission of the instructor.

COMM 595. Topics in Communication. 1-3 Credits.
The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule, and will be more fully described in information distributed to all academic advisors.

COMM 596. Topics in Communication. 1-3 Credits.
The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule, and will be more fully described in information distributed to all academic advisors.

COMM 597. Tutorial Work in Special Topics in Communication. 3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

COMM 598. Tutorial Work in Special Topics in Communication. 3 Credits.
Topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

COMM 600. Intercultural Communication: History, Theory and Application. 3 Credits.
Students begin with an overview and then cover (1) past intercultural communication research, (2) the philosophical underpinning and ethics behind intercultural communication research, and (3) current developments in intercultural communication theory. They then address the application of intercultural communication theory in specific intercultural communication contexts (e.g. business, education, health and international travel).

COMM 601. Lifespan Communication Research and Theory. 3 Credits.
This course takes a developmental approach to the study of communication by exploring the culminating effects of communication as it evolves across our lifetime. It encompasses all phases of life (birth-death) across interactions within family, work, social, health, and spiritual contexts. The focus is on foundational and contemporary lifespan theories and research.

COMM 602. Digital Communication Theory and Research. 3 Credits.
This class looks at emerging theories of new media and their transformative effects on industrial practices, news dissemination, cultural production, social interaction, and political engagement across the lifespan. Students engage in ongoing theoretical debates and participate in various online endeavors that offer real world research opportunities.

COMM 603. Social Change and Communication Systems. 3 Credits.
Examines the role of various communication systems in enacting social change involving commercial, governmental and not-for-profit contexts. Topics include persuasive techniques, community engagement, mobilizing large-scale social movements, and the political consequences of human and digital communication across the lifespan.

COMM 604. Lifespan Communication Research Methods. 3 Credits.
Prerequisites: COMM 601. An overview of social scientific and qualitative methods used in lifespan development communication research. Includes survey, experiment, observations, content and conversation analyses with an emphasis on developmental methods. Approaches to studying communication of children, adolescents, and later life are included.

COMM 605. Critical Methods and Digital Communication. 3 Credits.
Prerequisites: COMM 602. This class surveys the major methodological approaches available to critical communication researchers, such as semiology, structuralism, post-structuralism, neo-Marxism, and psychoanalysis, among others, within a cultural studies tradition. Special attention is paid to various digital communication technologies and how they are utilized throughout the lifespan.

COMM 607. Framing Theory. 3 Credits.
This course will investigate extant scholarship in framing theory and examine some real world applications of framing theory through case studies of how journalists cover news and the ways that “brand managers” position products and institutions.

COMM 615. Construction of the Gendered Body. 3 Credits.
This course will examine: (1) the nature-nurture controversy as reflected in current theories about gender as a significant factor in the transformation of physical bodies into social bodies, (2) cultural objects and institutions that shape our gender roles and expectations, and (3) nonverbal language and power and the status of the sexes.

COMM 623. Relational Communication Across the Lifespan. 3 Credits.
Prerequisites: Permission of the instructor. This course explores theories and research of communication in everyday relationships across the lifespan from early childhood relationships until relationships at the end of life. Communication in personal and social relationships, within age cohorts (early childhood, adolescence, adulthood) are highlighted.

COMM 624. Positive Communication Across the Lifespan. 3 Credits.
Prerequisites: Permission of the instructor. This course examines communication theories and research in light of the theories and research of positive psychology. Topics include: strengths-based communication theorizing, communication and happiness, positive communication functions, creative communication, and positive communication outcomes (health, wellness, peace, hope).

COMM 628. Mediated Human Communication in the Digital Age. 3 Credits.
This course conceptualizes the relationship established by the processes of human communication that are mediated by new media technologies. The course examines how such technologies affect social relationships, and how cultural values influence usage patterns of these technologies.

COMM 630. The Information Society. 3 Credits.
This course explores the theories, questions, claims and myths that have accompanied the rise of new communication technologies and electronically derived digital information that define the ‘Electronic Revolution,’ also known as the Information Society.

COMM 640. Television and Politics. 3 Credits.
This class closely examines television’s role in shaping and reflecting contemporary American political culture, the conduct of foreign policy, and formal political processes, such as elections.
COMM 650. Religious Communication. 3 Credits.
The seminar surveys the relationship between communication and religion with an emphasis on theory, research and applications. Topics may include the communication of religious beliefs/values via story, ritual, ceremony, worship, prayer and mediated communications.

COMM 668. Internship. 3 Credits.
Prerequisites: COMM 601 or COMM 602. A structured work experience providing both a conceptual understanding and on-the-job training in some aspect of lifespan and digital communication. A journal, a final paper, a log of hours, a portfolio of work, and a satisfactory evaluation by wok supervisor and cooperating faculty member are required.

COMM 672. New Communications Media and Social Development. 3 Credits.
Course explores the interaction between media technology deployment and social development in nations and sub-national groups. Special emphasis is placed on the paradigm of “networks” in both societies and technologies.

COMM 673. Television Histories as Collective Memory. 3 Credits.
This seminar explores the parameters and implications of “television as historian,” examines the general nature of this widespread phenomenon, and analyzes mass mediated versions of the past and how and why they were constructed.

COMM 675. Television in the Digital Era. 3 Credits.
This course examines the reinvention of television during the Digital Era (approximately 1995-Present). It identifies and analyzes the transformation of TV as a convergent technology, a viable art form, a global industry, a social catalyst, and a complex and dynamic reflection of the many audiences across the lifespan it reaches around the world.

COMM 678. Race and Television. 3 Credits.
This course examines the relationships among race, racial identity, and television. Multiple scholarly traditions are used to examine the interactions among television tests, audiences and institution, and historical and contemporary race relations.

COMM 685. Lifespan and Digital Communication Capstone Course. 3 Credits.
This is the capstone seminar for non-thesis students in their final semester to synthesize the relationships between lifespan and digital communication. Students will develop and complete a research paper or a digital communication project. Prerequisites: COMM 601, COMM 602, COMM 603, COMM 604, and COMM 605. Permission of graduate program director.

COMM 689. Thesis Preparation. 3 Credits.
Prerequisites: COMM 601, COMM 602, COMM 603, COMM 604, and COMM 605. This course is intended for students in the Master of Arts in Lifespan and Digital Communication program who choose the thesis option. Course topics include: developing a thesis proposal, thesis rules and regulations, the thesis committee, presenting and defending a thesis proposal, and acquiring the essential tools needed to write and successfully defend an MA thesis.

COMM 695. Topics in Communication. 3 Credits.
The study of selected topics designed to permit qualified students to work on subjects of mutual interest in a seminar format which, due to their specialized nature, may not be offered regularly.

COMM 697. Tutorial in Special Topics in Communication. 3 Credits.
Independent reading and study of a topic under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: Permission of the department chair.

COMM 698. Thesis Research. 3 Credits.
This course is intended for students in the Master of Arts in Lifespan and Digital Communication program who choose the thesis option. During the time a student is working on the MA thesis they must be enrolled in COMM 698, followed by COMM 699. Pre- or corequisite: COMM 689.

COMM 699. Thesis. 3 Credits.
This course is intended for students in the Master of Arts in Lifespan and Digital Communication program who choose the thesis option. During the time a student is working on the MA thesis they must be enrolled in COMM 698 followed by COMM 699.

COMM 795. Selected Topics in Communication Studies. 1-3 Credits.
The advanced study of selected topics in communication studies will be covered in such a way as to permit small groups of qualified students to study subjects of mutual interest which, due to their specialized nature, may not be offered regularly. Prerequisites: Permission of the instructor.

COMM 797. Independent Research in Communication Studies. 1-3 Credits.
Independent research directed by professors/faculty members examining communication topics. Prerequisites: Permission of the instructor.

COMM 895. Selected Topics in Communication Studies. 1-3 Credits.
The advanced study of selected topics in communication studies are covered in such a way as to permit small groups of qualified students to study subjects of mutual interest which, due to their specialized nature, may not be offered regularly. Prerequisites: Permission of the instructor.

COUN - Counseling

COUNSELING Courses

COUN 595. Topics. 1-6 Credits.

COUN 601. Principles of Professional Counseling and Ethics. 3 Credits. Lecture 3 hours; 3 credits. Aligned with a spiral approach to learning, students will be introduced to theory, practice, methods, basic principles, and concepts used by counselors in educational settings and community agencies. In subsequent courses, these topics will be revisited in depth. The course will emphasize professional and ethical issues related to counseling.

COUN 631. Counseling for Lifespan Development. 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: Admission to Counseling Graduate Program or graduate program director approval. A study of phase and stage theories of lifespan development with application to counseling. Current research findings on major developmental issues (e.g., gender) will be emphasized.

COUN 633. Counseling and Psychotherapy Techniques. 3 Credits.
The course focuses on development of attitudes and skills essential to effective professional counseling. Emphasis is on conducting the helping interview, as well as conducting an intake interview, a mental status evaluation, a biopsychosocial history, a mental health history, and a psychological assessment for treatment planning and caseload management. Pre- or corequisite: Admission to Counseling Graduate Program or Graduate Program Director approval.

COUN 634. Advanced Counseling and Psychotherapy Techniques. 3 Credits.
Advanced skills and practice in techniques used by counselors. Prerequisite: COUN 633 with a grade of B or higher.

COUN 642. Structured Counseling Groups. 3 Credits.
This course is designed to prepare students to facilitate structured counseling groups for children, adolescents and adults in a variety of settings. Prerequisites: Admission to Counseling graduate program or graduate program director approval; COUN 601, COUN 633 & COUN 650.

COUN 644. Group Counseling and Psychotherapy. 3 Credits.
Developing effective group leadership competencies is the focus for the course. Identification of group dynamics, use of group level process, and the self-development of the leader are some major topics. Prerequisite: Admission to Counseling graduate program or graduate program director approval; COUN 601, COUN 633, and COUN 650.
COUN 645. Testing and Client Assessment. 3 Credits.
This course examines individual and group approaches to formal and informal assessment techniques, including diagnosis. It includes an examination of: the history of assessment, basic test statistics; test worthiness (reliability, validity, and cross-cultural issues); the selection, administration, and interpretation of assessment instruments; and ethical and legal issues relative to assessment. The focus of this class is on major concepts and principles of psychological testing and evaluation and use of standardized instruments with differing populations.

COUN 647. Addictive Disorders. 3 Credits.
Examines the etiology, risk factors, assessment, counseling approaches and treatment of alcoholism and other addictions. Prerequisites: Admission to Counseling graduate program or graduate program director approval; COUN 601, COUN 633, and COUN 650.

COUN 648. Foundations of Career Development. 3 Credits.
Principles and theories of career development, occupational and educational information, employment trends, concepts and principles for effective work in educational and career planning and development are considered. Prerequisites: Admission to Counseling graduate program or graduate program director approval; COUN 601, COUN 645, and COUN 650.

COUN 650. Theories of Counseling and Psychotherapy. 3 Credits.
Lecture 3 hours; 3 credits. A study of major theories of counseling and psychotherapy. The primary focus is on providing students with a theoretical foundation upon which to develop their own approach for providing counseling and psychotherapy.

COUN 655. Social and Cultural Issues in Counseling. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: Admission to Counseling Graduate Program or graduate program director approval. Designed to engage helping professionals in cultural self-awareness and the search for solutions to disparities in society through counseling work. Emphasis on the social identities of gender, race, ethnicity, religion, ability, class, sexual orientation, and age.

COUN 665. Internship in Community Counseling. 1-6 Credits.
3-6 credits. Prerequisites: Departmental Permission. This internship is designed to provide individual students with a planned program of advanced on-the-job professional experience in a community agency counseling agency. A university instructor will coordinate internship assignments. An experienced professional in the community agency setting will provide direct supervision. Available for pass/fail grading only.

COUN 666. Internship in College Counseling. 1-6 Credits.
This internship is designed to provide individual students with a planned program of advanced on-the-job professional experience in a college or university setting. A university instructor will coordinate internship assignments. An experienced professional in the college or university setting will provide direct supervision. Available for pass/fail grading only. Prerequisites: Departmental permission and COUN 601, COUN 644, COUN 645, COUN 650, COUN 669, COUN 680, COUN 685, and COUN 686.

COUN 667. Internship in Mental Health Counseling. 1-9 Credits.
This counselor education experience is designed to provide a planned program of supervised clinical instruction in mental health counseling in an appropriate professional setting, including provision of direct service and performance of indirect professional activities under appropriate clinical supervision of a site supervisor as well as classroom instruction and supervision. This pass/fail course requires successful completion of 450 hours of counseling field placement work and 180 hours of direct service in each of two semesters of enrollment. Prerequisites: Admission to the Counseling Graduate Program or graduate program director approval, approved application; COUN 601, COUN 644, COUN 648, COUN 650, COUN 669, COUN 680, and COUN 685.

COUN 668. Internship in School Counseling. 1-6 Credits.
1 - 6 credits. Prerequisite: Admission to the Counseling Graduate Program or graduate director approval; Approved application; COUN 601, 642 or 644, 645, 648, 650, 669, 676, & 678. This internship is designed to provide individual students with a planned program of advanced on-the-job professional experience in a school setting. A university instructor will coordinate internship assignments. An experienced professional in the school setting will provide direct supervision. Available for pass/fail grading only.

COUN 669. Practicum in Counseling. 3 Credits.
This supervised experience will enable students to practice basic and intermediate individual and group counseling skills with clients while integrating knowledge and skills learned in previous course work. Prerequisites: Admission to the Counseling graduate program or graduate director approval; COUN 601, COUN 603, COUN 633, COUN 642 or COUN 644, COUN 650, and COUN 634 with a grade of B or higher (see Program Handbook for other prerequisites based on specialty area).

COUN 670. Introduction to Counseling Supervision. 3 Credits.
This course provides an opportunity to learn one’s personal style for supervision, to have supervised field supervision experiences and to gain an understanding of the different models of supervision. Prerequisites: Admission to the Counseling Graduate Program or graduate director approval; COUN 601, COUN 669.

COUN 676. Professional Issues in School Counseling K-12. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: Admission to the Counseling Graduate Program or graduate director approval. A professional seminar that emphasizes the contemporary role of the school counselor as leader and advocate in delivering school counseling programs to all students. Emphasis is placed on acquiring the awareness, knowledge and skills necessary to negotiate the cultural, educational, and contextual forces that impact the lives and academic achievement of students in a pluralistic society.

COUN 677. School Culture, Learning, and Classroom Management. 3 Credits.
School counselor’s role in contributing to a safe, equitable, and culturally responsive school culture; promoting student learning and achievement; and the practice of effective teaching and classroom management. Cultural, political, economic, ethical, and legal issues are addressed. Prerequisite: Admission to the Counseling graduate program or graduate program director approval; COUN 676.

COUN 678. Counseling Children and Adolescents in School Settings. 3 Credits.
This course will provide an overview of theories and techniques of counseling children and adolescents in school settings. Emphasis will be placed upon the counselor’s role as a facilitator of normal developmental processes to promote academic success. Prerequisites: Admission to the Counseling graduate program or graduate director approval; COUN 601, COUN 633, and COUN 650.

COUN 679. School Counseling Program Development K-12. 3 Credits.
This course is designed as a capstone experience that synthesizes graduate course work into a practical school counseling program manual. Emphasis is placed on assessment, data collection and analysis, design and development, implementation and evaluation of systemic school counseling programs K-12. Specific emphasis is given to the integration of assessed needs, the National Standards for School Counseling Programs and the Virginia Standards of Learning. Prerequisites: Admission to the Counseling Graduate Program or graduate director approval; COUN 601, COUN 642 or COUN 644, COUN 648, and COUN 676.

COUN 680. Mental Health Counseling, 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: Admission to the Counseling Graduate Program or graduate director approval. This course will examine the broad range of roles and functions of the mental health counselor within contemporary professional practice settings.
COUN 681. Couples Counseling. 3 Credits.
Couples counseling focuses on development of effective counseling skills in working with couples. Prerequisites: Admission to the Counseling graduate program or graduate director approval; COUN 601, COUN 633, and COUN 650.

COUN 685. Diagnosis and Treatment Planning in Mental Health Counseling. 3 Credits.
A course focused on developing knowledge, attitudes, and skills essential to effective DSM-IV diagnosis, client conceptualization assessment, and clinical treatment planning. Emphasis on the use of client conceptualization models as a basis for treatment planning in mental health counseling. Prerequisites: Admission to the Counseling graduate program or graduate director approval; COUN 601, COUN 633, and COUN 650.

COUN 686. College Counseling. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: Admission to the Counseling Graduate Program or Graduate program director approval. Overview of counseling services provided on college and university campuses. Topics include wellness of students, multicultural issues, ethical and legal issues, crisis and disaster response, advocacy, and program evaluation.

COUN 689. Understanding Military Connected Children and Families. 4 Credits.
Lecture, 3 hours; Service Learning, 2 hours. 4 credits. Prerequisite: Acceptance into the Military Child and Families Graduate Certificate Program. Approval of the Certificate Program Director REQUIRED. Participants will learn about the unique academic, social, and emotional challenges faced by military connected children and their families. Participants will review, analyze, and practice research-based learning and behavioral strategies and interventions to address these needs. This course will also introduce effective practices for supporting children through deployment separation, reunion and reintegration, and grief and trauma, including promoting school connectedness, fostering resiliency, facilitating coping skills, and designing customized academic, social, and behavioral supports. This course is required for completion of the Military Child and Family Education graduate certificate.

COUN 691. Family Systems and Family Development. 3 Credits.
The course offers a study of the family as a system, family life cycle stages, tasks, and difficulties that families may experience as they move through their developmental stages. Concepts and principles applicable to helping people within a systems perspective will also be discussed. Prerequisites: Admission to the Counseling graduate program or graduate director approval; COUN 601, COUN 633, and COUN 650.

COUN 695. Topics in Counseling. 3 Credits.
Lecture 1-6 hours; 1-6 credits. Prerequisites: Admission to the Counseling Graduate Program or graduate director approval. The study of selected topics in counseling.

COUN 707. Adult and College Student Development. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Exploration of theories informing practice regarding late adolescent, young adult, and adult psychological and cognitive development, adjustment, and learning in the two- and four-year college and university context. Influence of individual differences highlighted. Applications for college counseling, higher education, and community college practitioners, professionals, and leaders.

COUN 708. Constructivist Counseling and Positive Adult Development. 3 Credits.
This seminar-style course is an introduction to the fundamental constructivist principles that drive much of progressive adult education and counseling. Included are an introduction to developmental constructivism, social construction, post-modernism, and the narrative turn in counseling. Applications to counseling, education, and leadership will be made and implications for students’ own development will be examined.

COUN 742. Advanced Counseling Theory and Practice. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: COUN 601, 630, 633, 644, 645 and 650. An in-depth study of selected counseling theories through the study of cases.
COUN 835. Advanced Counseling Research and Program Evaluation. 3 Credits.
The doctoral-level course examines advanced topics and controversies in qualitative and quantitative counseling research; this integration of theoretical with applied counseling material will augment the department’s standard doctoral research offerings. Prerequisites: FOUN 814 and FOUN 822.

COUN 842. Advanced Counseling Theory and Practice. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: COUN 601, 630, 633, 645 and 650. An in-depth study of selected counseling theories through the study of cases.

COUN 844. Advanced Group Counseling. 3 Credits.
3 hours; 3 credits. Prerequisites: COUN 601, 630, 633, 644, 645, and 650. Development of group leadership skills through group experiences in class and in the field.

COUN 845. Diagnosis and Treatment Planning. 3 Credits.

COUN 846. Advanced Counseling Supervision. 3 Credits.
Prerequisites: FOUN 814 and FOUN 822. This course provides advanced training and skill development in supervision. Specific topics in supervision will also be examined. These include: ethical and legal issues, multicultural competency in supervision; theories of counselor development; theories/models, processes, and skills in supervision. Students will conduct the COUN 669 practicum classes under faculty supervision.

COUN 847. Chemical Dependency Counseling. 3 Credits.

COUN 848. Multicultural Perspectives in Counselor Education, Supervision, and Research. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: Admission to PhD Program or Graduate Program Director Approval. Counseling doctoral students will study multicultural issues in counselor preparation graduate programs, counseling supervision, and counseling research.

COUN 864. Practicum in Counselor Education. 3 Credits.
Supervised practicum in a counseling graduate program. Teach a 3-credit counseling graduate course under supervision. Participant in program meetings and activities. Minimum of 200 contact hours.

COUN 865. Practicum in Clinical Mental Health Counseling Leadership. 3 Credits.
Supervised practicum in a mental health counseling agency or organization. Participate in management and leadership activities. Minimum of 200 hours. Prerequisites: Admission to the Counseling Graduate Program or graduate program director approval.

COUN 866. Practicum in College Counseling Leadership. 3 Credits.
Supervised practicum in a community college, four-year college, or university counseling unit. Participate in unit management and leadership activities. Minimum of 200 hours.

COUN 867. Practicum in School Counseling Leadership. 3 Credits.
Practicum. 3 credits. Supervised practicum in district level school counseling leadership office. Participate in office management and leadership activities. Minimum of 200 hours.

COUN 868. Internship in Counseling. 3-6 Credits.
This internship is designed to provide individual students with a planned program of advanced on-the-job professional experience in a college or community/agency setting. Internship assignments will be controlled and coordinated by a university instructor. Direct supervision is given by an experienced professional in the setting. Minimum of 600 hours.

COUN 869. Advanced Supervised Practicum in Counseling. 3 Credits.
Prerequisites: COUN 801, COUN 820, COUN 742/COUN 842, COUN 744/ COUN 844. This advanced supervised practicum in counseling experience will enable doctoral-level students to develop and/or refine advanced counseling skills and conceptually link counselor practice and supervision. Minimum of 200 hours.

COUN 881. Family Therapy. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: COUN 601, 630, 633, 644, 645, and 650. A study of theories and practice of family therapy.

COUN 883. Complementary & Alternative Therapies in Mental Health Counseling. 3 Credits.
The course provides an overview of complementary and alternative therapies being used in mental health today, looking at their effectiveness and safety in treating specific client populations and for use in treating specific disorders, including ADHD, depression, addictions, and anxiety. Modalities covered include acupuncture, nutritional medicine, herbal medicine, biofeedback, meditation, hypnotherapy, aromatherapy, and others. Prerequisites: Admission to the Counseling graduate program or graduate program director approval.

COUN 886. Spirituality in Counseling. 3 Credits.
An overview of methods for integrating spirituality into counseling as a means of promoting holistic wellness for both clients and counselors. Emphasis will be placed upon theories of spiritual development, beliefs inherent in major wisdom traditions, implicit and explicit strategies for integrating spirituality into counseling, and the counselor’s own personal and professional awareness and growth.

COUN 892. Internship in Counseling and Urban Services. 3-12 Credits.

COUN 895. Topics in Counseling. 1-6 Credits.
Lecture 1-6 hours; 1-6 credits. The study of selected topics in counseling.

COUN 897. Topics in Counseling. 1-6 Credits.
Consultation 1-6 hours; 1-6 credits. Individual study under the supervision of a graduate faculty member.

COUN 898. Dissertation Seminar. 3 Credits.
This seminar is designed to assist students in making substantive progress in identifying and developing their dissertation proposal. Students will critically examine the current literature associated with their research interests and examine applicable conceptual constructs and methodologies.

COUN 899. Dissertation. 1-12 Credits.
1-12 credits.

COUN 999. Counseling 999. 1 Credit.

CRIM - Criminology

CRIMINOLOGY Courses

CRIM 700. Proseminar in Criminology and Criminal Justice. 3 Credits.
This course provides students with a broad overview of enduring topics and emerging issues in criminology and criminal justice. It also explores the history and role of criminology as an academic discipline and criminal justice as an institutional system in American society.

CRIM 701. Criminology and Public Policy. 3 Credits.
This course covers the policy process as it relates to crime legislation, criminological theory and implications for public policy.

CRIM 702. Advanced Criminological Theory. 3 Credits.
This course is an examination of criminological theory for the advanced student. The focus is on critical analysis of both contemporary and historical criminological theories. In order to aid in the development of a critical understanding of theory, beyond understanding the content of central theories, the class focuses on discussion of theory development and testing. In addition, the class focuses on an understanding of the relationship of one theory to another as well as the state of empirical evidence surrounding each theory.

CRIM 703. Inequality, Crime and Justice. 3 Credits.
This course examines the linkages between social characteristics and crime. The course concentrates on what we know about the impact of gender, age, race and social class on crime and criminal justice.

CRIM 705. Multivariate Statistics in Criminological Research. 3 Credits.
This course teaches multivariate statistical techniques to train criminal justice researchers and policy makers to explore the causes and consequences of crime and criminal justice policies. Although the exact statistical techniques covered may vary, they will typically include multiple regression, multiple discriminate analysis, logistic regression, factor analysis, cluster analysis and path analysis.
CRIM 710. Qualitative Methods in Criminology and Criminal Justice. 3 Credits.
The central goal of this graduate seminar is to enable students to create and critique qualitative research designs focused on contemporary issues in criminology and criminal justice. A number of qualitative approaches will be covered including field observational research, focused interviews, case studies and content analysis. The seminar explores techniques, strengths and limitations of these varied qualitative methodologies.

CRIM 715. Advanced Quantitative Techniques in Criminology & Criminal Justice. 3 Credits.
This course explores advanced statistical techniques commonly used in research on crime and justice. The major focus of the course will be hierarchical linear modeling (HLM), a diverse set of techniques that extend standard multivariate analysis to accommodate nested data. Other advanced techniques will also be covered: event history/survival models, time series, etc.

CRIM 720. Advanced Research Methods in Criminology & Criminal Justice. 3 Credits.
This course provides students with advanced understanding of issues in criminology/criminal justice research including: history, philosophy, sociology, epistemology, politics and ethics of social science research; methodological questions of reliability, validity, conceptualization, operationalization, scale construction, data collection methodologies, sampling.

CRIM 740. Social Structures, Crime and Justice. 3 Credits.
This course examines the links between social structures and institutions, and justice at the individual, neighborhood, city, state and country levels. Students explore the ways in which structures and institutions are both agents of social control and facilitators or initiators of crime. Emphasis will be placed on theories, methodologies and empirical assessments.

CRIM 745. Crime and Communities. 3 Credits.
This course provides a foundation of the most important theories and research relating to residential communities and crime. The casual linkages between features of neighborhoods and social disorder will be explored in the context of criminological theories. Students will emerge with sufficient knowledge to develop a class or design a significant research project.

CRIM 750. Crimes of the State. 3 Credits.
This course explores crimes of the state from a sociological and criminological perspective by examining historical and current cases of governmental crime. This will cover the history, theory and method of the field; controls of and constraints on state crime; and cases of state crime.

CRIM 755. Researching the Criminal Justice System. 3 Credits.
Students will develop original research projects on the criminal justice system, police, courts and/or corrections. Projects will be designed to culminate in a publishable paper.

CRIM 760. Life Course Criminology. 3 Credits.
This course is designed to introduce graduate students to life-course perspectives for understanding crime and deviant behavior. Students discuss the various methodologies, both quantitative and qualitative, most commonly found in studies of the life course today.

CRIM 795. Topics in Criminal Justice. 1-3 Credits.
Topics vary by semester.

CRIM 797. Independent Study. 1-3 Credits.
Supervised independent study arranged with instructor and approved by graduate program director.

CRIM 800. Proseminar in Criminology and Criminal Justice. 3 Credits.
This course provides students with a broad overview of enduring topics and emerging issues in criminology and criminal justice. It also explores the history and role of criminology as an academic discipline and criminal justice as an institutional system in American society.

CRIM 801. Criminology and Public Policy. 3 Credits.
To familiarize students with the policy process as it relates to crime legislation, criminological theory and implications for public policy.

CRIM 802. Advanced Criminological Theory. 3 Credits.
This course is an examination of criminological theory for the advanced student. The focus is on critical analysis of both contemporary and historical criminological theories. In order to aid in the development of a critical understanding of theory, beyond understanding the content of central theories, the class focuses on discussion of theory development and testing. In addition, the class focuses on an understanding of the relationship of one theory to another as well as the state of empirical evidence surrounding each theory.

CRIM 803. Inequality, Crime and Justice. 3 Credits.
This course examines the linkages between social characteristics and crime. The course concentrates on what is known about the impact of gender, age, race and social class on crime and criminal justice.

CRIM 805. Multivariate Statistics in Criminological Research. 3 Credits.
This course teaches multivariate statistical techniques to train criminal justice researchers and policy makers to explore the causes and consequences of crime and criminal justice policies. Although the exact statistical techniques covered may vary, they will typically include multiple regression, multiple discriminate analysis, logistic regression, factor analysis, cluster analysis and path analysis.

CRIM 810. Qualitative Methods in Criminology and Criminal Justice. 3 Credits.
The central goal of this graduate seminar is to enable students to create and critique qualitative research designs focused on contemporary issues in criminology and criminal justice. A number of qualitative approaches will be covered including field observational research, focused interviews, case studies and content analysis. The seminar explores techniques, strengths and limitations of these varied qualitative methodologies.

CRIM 815. Advanced Quantitative Techniques in Criminology & Criminal Justice. 3 Credits.
This course explores advanced statistical techniques commonly used in research on crime and justice. The major focus of the course is hierarchical linear modeling (HLM), a diverse set of techniques that extend standard multivariate analysis to accommodate nested data. Other advanced techniques are also covered: event history/survival models, time series, etc.

CRIM 820. Advanced Research Methods in Criminology & Criminal Justice. 3 Credits.
This course provides students with advanced understanding of issues in criminology/criminal justice research including: history, philosophy, sociology, epistemology, politics and ethics of social science research; methodological questions of reliability, validity, conceptualization, operationalization, scale construction, data collection methodologies, sampling.

CRIM 840. Social Structures, Crime and Justice. 3 Credits.
This course examines the links between social structures and institutions, and justice at the individual, neighborhood, city, state and country levels. Students explore the ways in which structures and institutions are both agents of social control and facilitators or initiators of crime. Emphasis will be placed on theories, methodologies and empirical assessments.

CRIM 845. Crime and Communities. 3 Credits.
This course provides a foundation of the most important theories and research relating to residential communities and crime. The casual linkages between features of neighborhoods and social disorder will be explored in the context of criminological theories. Students will emerge with sufficient knowledge to develop a class or design a significant research project.

CRIM 850. Crimes of the State. 3 Credits.
This course explores crimes of the state from a sociological and criminological perspective by examining historical and current cases of governmental crime. This will cover the history, theory and method of the field; controls of and constraints on state crime; and cases of state crime.
CRJS 560. Blacks, Crime and Justice. 3 Credits.
Examines historical and contemporary theories and research on African-Americans, criminal behavior and the administration of justice. Selected topics will include African-American perspectives, the death penalty, victimization, police brutality, and justice systems in Africa and the Caribbean.

CRJS 562. Substantive Criminal Law. 3 Credits.
This course deals with the major substantive concepts involved in American criminal law, including development of criminal law, elements of criminal liability, defenses against criminal responsibility, and descriptions and definitions of specific offenses.

CRJS 575. Criminal Justice Systems Around the World. 3 Credits.
The study of criminal justice systems around the world in order to understand how criminal behavior is defined and responded to in various cultures. Cultural differences will be highlighted in order to recognize that definitions of and responses to crimes closely reflect the cultures in which they exist.

CRJS 595. Topics in Criminal Justice. 3 Credits.
The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule, and will be more fully described in information distributed to academic advisors.

CRJS 596. Topics in Criminal Justice. 3 Credits.
The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule, and will be more fully described in information distributed to academic advisors.

CRJS 597. Tutorial Work in Special Topics in Criminal Justice. 1-3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

CRJS 598. Tutorial Work in Special Topics in Criminal Justice. 1-3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

CRJS 620. Criminological Theory. 3 Credits.
An in-depth study of the major theoretical issues in criminology. The course deals extensively with issues of crime causation, the way theory shapes and informs the study of crime and related social issues, and the relationship between theory, research, and practice.

CRJS 625. The Administration of Criminal Justice. 3 Credits.
An analysis of the criminal justice system with an emphasis on the decision-making responsibilities of its officials.

CRJS 627. Violence Against Women. 3 Credits.
This course examines the many ways in which violence against women functions as an agent of social control. Violence is viewed on a continuum in order to determine how a variety of acts contribute to the subordination of women. Specific types of violence are explored including: wife assault, rape, incest, sexual harassment and pornography.

CRJS 650. Research Seminar. 3 Credits.
This seminar integrates the skills needed to complete a master’s thesis. Exercises include formulating research questions, developing a research design, and writing a publishable paper. Students practice these skills through assignments in class and by completing their thesis proposal. Prerequisites: SOC 610 or CRJS 610, SOC 620 or CRJS 620, SOC 630 or CRJS 630, and SOC 640 or CRJS 640.

CRJS 661. Policing. 3 Credits.
A study of the major issues in law enforcement agencies, personnel and strategies. Topics focus on the impact of social control on the officers and society.
CS 550. Database Concepts. 3 Credits.

CS 551. Software Engineering Survey. 3 Credits.
Lecture 3 hours; 3 credits. Laboratory work required. Evaluation of software development methodologies. Topics include: software life cycle models, software specification and design methodologies, informal specification techniques, formal specifications, design tools, software analysis, quality assurance, life cycle management, software costing models and complexity.

CS 554. Network Management. 3 Credits.
Lecture 3 hours; 3 credits. Laboratory work required. The administration of computer networks and their interaction with wide area networks: network topologies for local and wide area networks, common protocols and services, management of distributed file services, routing and configuration, security, monitoring and trouble-shooting.

CS 555. Introduction to Networks and Communications. 3 Credits.
Lecture 3 hours; 3 credits. Laboratory work required. OSI and TCP/IP reference models and protocols. Hardware survey, datalink, network, and transport layers. Broadcast and point-to-point networking techniques, routing, switching, and LAN media access. Internetworking, ATM, Gigabit Ethernet, wireless networks, and network security.

CS 556. Database Administration I. 3 Credits.
Lecture 3 hours; 3 credits. Laboratory work required. Programming in SQL and PL/SQL and hands-on development of DBA administration skills in the ORACLE database environment. Creating database objects, querying and manipulating, and PL/SQL programming constructs. Setup and administer databases. Create, organize, and manage database files, users, privileges and other resources.

CS 557. Database Administration II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: A grade of C or better in CS 556. Laboratory work required. Advanced DBA administration skills in the Oracle database environment. Topics in planning and implementing backup and recovery of the database. Performance optimization and tuning of database and applications including memory and disk structures. Configuration and maintenance of clients and servers in a network environment.

CS 558. Unix System Administration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: experience with UNIX. Laboratory work required. Aspects of administering a SOLARIS/UNIX operating system in a networked environment are covered. Topics covered include installation, file system management, backup procedures, process control, user administration, device management, Network File Systems (NFS), Network Information Systems (NIS), UNIX security, Domain Name Services (DNS), and integration with other operating systems.

CS 560. Computer Graphics. 3 Credits.
Lecture 3 hours; 3 credits. Laboratory work required. An introduction to graphical systems and methods. Topics include basic primitives, windowing, transformations, hardware, interaction devices, 3-D graphics, curved surfaces, solids, and realism techniques such as visible surface lighting, shadows, and surface detail. Requires project involving OpenGL programming.

CS 562. Cybersecurity Fundamentals. 3 Credits.
The course introduces the basic components and concepts needed for understanding cybersecurity. These include basics and security vulnerabilities of networks, operating systems, databases, and distributed systems. In addition, some fundamentals of security enforcement will be introduced and discussed.
CS 563. Cryptography for Cybersecurity. 3 Credits.
Mathematical foundations including information theory, number theory, factoring, and prime number generation; Cryptographic protocols including basic building blocks and protocols; Cryptographic techniques including key generation and key management, and applications; Cryptographic algorithms—DES, AES, Stream Ciphers, Hash functions, digital signatures, etc. Prerequisite: CS 270.

CS 564. Networked Systems Security. 3 Credits.
Authorization in cyber systems including password-based, address-based, biometrics-based, and SSO systems; Authorization and accounting in cyber systems; Securing wired and wireless networks; Secured applications including secure e-mail services, secure web services, and secure e-commerce applications; Security and privacy in cloud environments.

CS 565. Information Assurance. 3 Credits.
Introduction to information assurance. Metrics, planning and deployment; identity and trust technologies; verification and evaluation, incident response; human factors; regulation, policy languages, and enforcement; legal, ethical, and social implications; privacy and security trade-offs; system survivability; intrusion detection; fault and security management. Prerequisites: CS 456 or CS 556 and CS 471.

CS 575. Introduction to Computer Simulation. 3 Credits.
Lecture 3 hours; 3 credits. Efficient implementation methods. Time management. Planning and design of simulation experiments. Statistical issues in simulation. Generation of random numbers and stochastic variates. Programming with graphically- and text-based simulation languages. Verification and validation of simulation models. Distributed simulation. Special topics such as HLA will be discussed.

CS 576. Systems Programming. 3 Credits.
Lecture 3 hours; 3 credits. Laboratory work required. This course is to help students fully understand and utilize the internal workings and capabilities provided by modern computing, networking and programming environments. Topics include: Shell Script Programming, X Windows (Xlib and Motif), UNIX internals (I/O, Processes, Threads, IPC and Signals), Network Programming (UDP/TCP Sockets and Multicasting) and Java Systems Programming (SWING, Multithreading and Networking).

CS 578. Computational Geometry, Methods and Applications. 3 Credits.
The discipline of Computational Geometry is devoted to the study of algorithms which are formulated in terms of spatially embedded arrangements of objects, such as points, lines, surfaces, and solids. This course covers fundamental algorithms including convex hulls, polygon triangulations, point location, Voronoi diagrams, Delaunay triangulations, binary space partitions, quadtrees, and other topics.

CS 580. Introduction to Artificial Intelligence. 3 Credits.
Lecture 3 hours; 3 credits. Laboratory work required. Introduction to concepts, principles, challenges, and research in major areas of AI. Areas of discussion include: natural language and vision processing, machine learning, machine logic and reasoning, robotics, expert and mundane systems.

CS 586. Introduction to Parallel Computing. 3 Credits.

CS 588. Principles of Compiler Construction. 3 Credits.
Lecture 3 hours; 3 credits. Laboratory work required. Theoretical and practical aspects of compiler design and implementation. Topics will include lexical analysis, parsing, translation, code generation, optimization, and error handling.

CS 595. Topics in Computer Science. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

CS 597. Independent Study in Computer Science. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor. Independent study under the direction of an instructor.

CS 600. Algorithms and Data Structures. 3 Credits.
Lecture 3 hours; 3 credits. Design of efficient algorithms and the mathematical analysis of their performance. Topics to be covered include: mathematical preliminaries, sorting and order statistics, advanced data structures, linear programming, exploring graphs, parallel algorithms, randomized algorithms, transformation of the domain, and NP-completeness. (offered fall).

CS 635. Parallel Computer Architecture. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: CS 665. This is a first course in parallel architecture, with an emphasis on the description and evaluation of commercially available machines. Topics to be covered include: parallelization and performance metrics, scalability and the "laws" of Amdahl and Gustavson, computational similarity, models of computation, parallelization paradigms, network characteristics and topology, communication calculus and templates, pipelining and parallelism, processor types, memory hierarchy, cache coherence protocols, latency-hiding mechanisms, routing algorithms, and languages and libraries to support parallel architecture.

CS 656. Database Methodology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: CS 550. Laboratory work required. Analysis, design and implementation of databases and database applications using modern software engineering methods. Database CASE tools. Analysis using process, function, and dataflow analysis in conjunction with entity relationship modeling. Database diagrams and database design. Application suite design and high level design of applications. Refining implementations.

CS 660. 3D Computer Graphics. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: CS 560. Laboratory work required. The mathematical tools needed for the geometrical aspects of 3D computer graphics. Fundamentals: homogeneous coordinates, transformations and perspective. Theory of parametric and implicit curve and surface models: polar forms, Bezier arcs and de Casteljau subdivision, continuity constraints, B-splines, tensor product, and triangular patch surfaces. Representations of solids and conversions among them. Geometric algorithms for graphics problems, with applications to ray tracing, hidden surface elimination, etc.

CS 665. Computer Architecture. 3 Credits.
Lecture 3 hours; 3 credits. A detailed and quantitative study of the architecture of modern uni-processor computers. The major components are: the technology drivers, performance measures, instruction sets (including 80X86, VAX, and a generic RISC which is very similar to the MIPS series), processor implementation, advanced pipelining and superscalar features, cache and memory design, and I/O. The emphasis is on obtaining quantitative measures of performance, describing interactions of the various components, studying trade-offs between the components in commercial processors, and integration into a complete computer system including interaction of the software and hardware. (offered spring).

CS 667. Cooperative Education. 1-3 Credits.
CS 669. Practicum. 1-3 Credits.
CS 690. Colloquium. 1 Credit.
Lecture 1 hour; 1 credit. A one-hour weekly lecture given by faculty from Old Dominion and other institutions.

CS 695. Topics. 1-3 Credits.
CS 697. Independent Study in Computer Science. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

CS 698. Master's Project. 3 Credits.
3 credits. Departmental permission required.

CS 699. Thesis Research. 3 Credits.
3 credits. Departmental permission required.
CS 710. Applied Algorithms. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: CS 600. Laboratory work required. The course will involve solving two or three comprehensive projects anchored in computer science and engineering. Possible topics for projects include: computational issues in network design and analysis; scheduling problems and applications; digital geometry and pattern recognition; image processing and computer vision applications; robotics. The basic thrust is to demonstrate the usefulness and power of algorithm design and analysis in solving real-life problems.

CS 711. Software Validation. 3 Credits.
Lecture 3 hours; 3 credits. Laboratory work required. The most common path to improved confidence in a program is via testing. This course explores divergent and sometimes conflicting approaches to conducting testing and to measuring the resulting confidence. Topics include the theoretical basis for testing, common testing methods, statistical measures of program reliability, and the relationship between correctness and reliability.

CS 712. Stochastic Modeling. 3 Credits.
Stochastic processes are ways of quantifying the dynamic relationship of sequences of random events. This course will expose the participants to standard concepts and methods of stochastic modeling, as well as the rich diversity of applications. Topics include, but not limited to, Markov chains in discrete and continuous time, Poisson processes, renewal theory and branching processes.

CS 713. Modeling and Simulation in Computational Biology. 3 Credits.
This course covers current problems and state of computations in bimolecular modeling, molecular mechanics including force field origin, composition, and evaluation techniques, and simulation techniques including conformational sampling, geometry optimization, molecular dynamics and Brownian dynamics.

CS 714. Monte Carlo Simulation. 3 Credits.
This course serves to illustrate important principles in Monte Carlo simulation methods and to demonstrate their power in applications. The course covers Metropolis-Hastings algorithm, Gibbs sampler, Markov Chain Monte Carlo, acceptance-rejection method, Monte Carlo integration, quasi-Monte Carlo, random walk, and random number generation.

CS 715. Medical Image Computing and Simulation. 3 Credits.
This course combines the theory and practices in medical imaging computing with emphasis on Image Guided Therapy (IGT). Topics include rigid registration, approximation/interpolation, segmentation, no-rigid registration, image-to-tensor conversion, real time parallel computing, software development for medical applications and solution of large sparse linear systems.

CS 716. Communication Networks Simulation and Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. Fundamental topics in bioinformatics; introduction to molecular biology, pairwise sequence alignment, database search methods such as FASTA and BLAST, multiple sequence alignment, genome scale alignment, protein secondary structure prediction, and protein tertiary structure prediction. Computational projects are expected in this course.

CS 717. Bioinformatics I – NonCS. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: permission of instructor. This is a bioinformatics course for non-CS majors. It introduces the fundamental topics in bioinformatics: introduction to molecular biology, pairwise sequence alignment, database search methods such as FASTA and BLAST, multiple sequence alignment, genome scale alignment, protein secondary structure prediction and protein tertiary structure prediction.

CS 722. Machine Learning. 3 Credits.
This course presents both the foundational and the practical aspects of modeling, analyzing, and mining of computerized data sets, including classification, regression, clustering, semi-supervised learning, structured sparsity learning, etc. The course assignments are designed to contain both theoretical and programming components in order to train students to gain hands-on-experience.

CS 723. Introduction to Bioinformatics. 3 Credits.
This course introduces the fundamental knowledge in bioinformatics and the current advances in selected directions. The topics include: fundamental concepts and experimental techniques in molecular biology, computational methods in genomic sequence comparison and analysis, and computational methods in molecular structural modeling.

CS 724. High Performance Computing with GPU for Large Scale Simulation. 3 Credits.
This course introduces parallel programming principles and has emphasis on hands-on programming and deploying high-performance computing applications for different science and engineering disciplines. Topics include programming on NVIDIA GPU, efficient GPU accelerated implementation of: (a) computation intensive kernels (b) few sample large scale financial and molecular dynamics simulations, and (c) large scale data analytics and mining.

CS 725. Information Visualization. 3 Credits.
This course covers the theory and application of information visualization. Research on graph design, visual perception, cognition, and interaction will be covered. Research and practical techniques for the display of graphs, networks, hierarchies, text, and complex multivariate data will be addressed. Course projects will require the development of interactive web-based visualizations.

CS 726. Application of Graphs in Bioinformatics. 3 Credits.
This course links the fundamental concepts and algorithms of graphs with the actual biological problems. Various biological problems will be selected to discuss the formulation of the graph, the graph algorithms, and the performance analysis.

CS 744. Performance Evaluation of Computer Systems and Networks. 3 Credits.
Lecture 3 hours; 3 credits. The course will introduce some of the commonly used techniques in the performance evaluation of computing systems. Students will be exposed to a variety of analytical and simulation tools used in this field. The applicability of the techniques will be illustrated through case studies.

CS 751. Introduction to Digital Libraries. 3 Credits.
Lecture 3 hours; 3 credits. Digital Libraries (DLs) are an increasingly popular research area that encompass more than traditional information retrieval or database methods and techniques. The course will cover a brief history of DL development, with emphasis on World Wide Web implementations. Case studies will be performed on various DLs. The class will focus heavily on project work. At the end of the course, students will be prepared to develop, evaluate, or apply digital library technologies in their work environment. Topics include: Repositories; Distributed Searching; Metadata Harvesting; Preservation, Reference Linking and Citation Analysis.

CS 752. Wireless Communications and Mobile Computing. 3 Credits.
Lecture 3 hours; 3 credits. This course looks at fundamental issues in the area of wireless networks and mobile computing. The course material is organized around the following broad themes: Basics of mobile and wireless communications; Cellular communications; Bandwidth allocation and reservation; Location management; Call admission strategies and QoS issues; Mobile IP and Mobile TCP; Mobile Ad-Hoc NETworks (MANET); Routing, Multimedia and QoS support; Sensor networks.

CS 771. Advanced Operating Systems. 3 Credits.
Lecture 3 hours; 3 credits. This course covers principles, design decisions, design techniques, policies, and mechanisms in the design and implementation of general-purpose multiprogramming and distributed operating systems. Topics to be covered include: concurrency, interprocess communication, threads, access control, protection and authentication, multiprocessor operating systems.
Lecture 3 hours; 3 credits. This course deals with the basic protocols, techniques and programming issues to secure internet applications and traffic. Topics include: Cryptographic algorithms tools and concepts; Secure Socket Layer (SSL), Transport Layer Security (TLS) and IPSec protocols; Securing Internet Applications; HTTP, SMTP, UDP and multicast; Hands on socket programming using C and Java.

CS 775. Distributed Systems. 3 Credits.
Lecture 3 hours; 3 credits. This course deals with the design issues in distributed computing systems and will discuss the motivation for building distributed systems, various algorithms and protocols proposed in literature for system operability, and some of the experimental distributed systems that have been built in the last few years. Special attention will be paid to the fault-tolerant and performance aspects of these systems. The project component of this course will enable students to get hands-on experience of implementing some of the distributed algorithms.

CS 778. Networked Multimedia Systems. 3 Credits.
Lecture 3 hours; 3 credits. This course will introduce some of the technical foundations for capturing, transmitting, presentation and storage of continuous multimedia. Students will explore the applications of multimedia and techniques in some areas such as group collaboration and network based education. Topics covered include: Architectures and issues for distributed Multimedia Systems Support for real-time multimedia applications, quality-of-service, synchronization, and presentation of multiple multimedia streams.

CS 779. Design of Network Protocols. 3 Credits.
Lecture 3 hours; 3 credits. Understanding the design, implementation and performance of network protocols using TCP/IP protocol suite as a case study. The students will have hands-on experience on low-level tools and will access and study the source code of these protocols and writing networking software applications. Topics include: socket interface, IPv4 and IPv6, routing, UDP, multicasting and IGMP, TCP specification, implementation and performance.

CS 791. Graduate Seminar. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

CS 795. Topics in Computer Science. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

CS 796. Topics in Computer Science. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

CS 810. Applied Algorithms. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: CS 600. Laboratory work required. The course will involve solving two or three comprehensive projects anchored in computer science and engineering. Possible topics for projects include: computational issues in network design and analysis; scheduling problems and applications; digital geometry and pattern recognition; image processing and computer vision applications; robotics. The basic thrust is to demonstrate the usefulness and power of algorithm design and analysis in solving real-life problems.

CS 811. Software Validation. 3 Credits.
Lecture 3 hours; 3 credits. Laboratory work required. The most common path to improved confidence in a program is via testing. This course explores divergent and sometimes conflicting approaches to conducting testing and to measuring the resulting confidence. Topics include the theoretical basis for testing, common testing methods, statistical measures of program reliability, and the relationship between correctness and reliability.

CS 812. Stochastic Modeling. 3 Credits.
Stochastic processes are ways of quantifying the dynamic relationship of sequences of random events. This course will expose the participants to standard concepts and methods of stochastic modeling, as well as the rich diversity of applications. Topics include, but not limited to, Markov chains in discrete and continuous time, Poisson processes, renewal theory and branching processes.

CS 813. Modeling and Simulation in Computational Biology. 3 Credits.
This course covers current problems and state of computations in bimolecular modeling, molecular mechanics including force field origin, composition, and evaluation techniques, and simulation techniques including conformational sampling, geometry optimization, molecular dynamics and Brownian dynamics.

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This course serves to illustrate important principles in Monte Carlo simulation methods and to demonstrate their power in applications. The course covers Metropolis-Hastings algorithm, Gibbs sampler, Markov Chain Monte Carlo, acceptance-rejection method, Monte Carlo integration, quasi-Monte Carlo, random walk, and random number generation.

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CS 891. Graduate Seminar. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

CS 895. Topics in Computer Science. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

CS 896. Topics in Computer Science. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

CS 899. Doctoral Dissertation. 1-9 Credits.
1-9 credits. Departmental permission required.

CS 999. Computer Science 999. 1 Credit.
1 credit. A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

CSD - Communication Sci & Disorders

COMMUNICATION SCI DISORDERS Courses

CSD 547. Introduction to Language Disorders in Children. 3 Credits.
Prerequisites: permission of the instructor. This course presents an introduction to the various language disorders manifested by children and adolescents with a focus on characteristics, etiologies and general intervention approaches.

CSD 548. Speech-Language and Hearing Programs in the Public Schools. 3 Credits.
Prerequisites: CSD 550 and CSD 560. The emphasis of this course is on the organization and administration of public school speech-language and hearing programs, as well as clinical, professional and legal issues related to service delivery.

CSD 549. Introduction to Clinical Procedures in Speech-Language Pathology. 3 Credits.
Prerequisites: permission of the instructor. This course provides an introduction to basic clinical procedures and competencies in speech-language pathology with an emphasis on language sampling and identification of grammatical categories. Professionals practicing in the field of speech-language pathology require these skills. This course includes structured and supervised observation activities. ASHA requires 25 supervised hours of therapy observation. (This is a writing intensive course.).

CSD 550. Survey of Communication Disorders. 3 Credits.
Prerequisites: permission of the instructor. This course is designed to acquaint the student with recognition, identification, and understanding of speech and language disorders.

CSD 551. Articulation and Phonological Disorders. 3 Credits.
Prerequisites: CSD 352 and CSD 450/550. This course emphasizes causes, identification and treatment of articulation and phonological disorders.

CSD 552. Voice Disorders. 3 Credits.
This course focuses upon anatomical and physiological bases, etiologies, assessment and treatment of voice disorders.

CSD 553. Language Development. 3 Credits.
This course emphasizes language development from the perspective of the speech-language pathologist.
CSD 554. Clinical Practica in Speech Pathology/Audiology I, II. 4 Credits.
Prerequisites: CSD 650, CSD 549, CSD 550, CSD 551, CSD 553, CSD 559, CSD 560, and permission of program faculty. These practica are designed to provide students with experiences in the evaluation and treatment of communication disorders. (Qualifies as a CAP experience).

CSD 557. Language Diagnosis and Remediation. 3 Credits.
Prerequisites: CSD 550 and CSD 553. This course acquaints the student with diagnostic methods and remediation techniques for the language-disordered and nonverbal child.

CSD 558. Speech and Hearing Science. 3 Credits.
The content of this course focuses upon basic acoustics, speech acoustics, psychoacoustics, speech perception, and clinical laboratory instrumentation. The course is designed to provide fundamental information regarding normal and abnormal aspects of speech and hearing processes.

CSD 559. Seminar in Speech Pathology Methods and Materials. 3 Credits.
This course focuses upon current therapy methods, equipment, and materials which are utilized in the remediation of communicative disorders.

CSD 560. Hearing Disorders and Basic Audiology. 3 Credits.
A study of the physics of sound, anatomy, and physiology of the human ear, basic audiometry and hearing disorders.

CSD 561. Aural Rehabilitation I. 3 Credits.
A study of audiological findings and the implications for hearing therapy; speech and language development of the deaf.

CSD 565. Signing I-Beginning Nonverbal Communication. 3 Credits.
Prerequisites: permission of the instructor. Study of the grammatical structure and use of American sign language; exposure to ideals and culture of the deaf community. (This course does not satisfy the general education foreign language skills requirement).

CSD 560. Organic Speech-Language Disorders. 3 Credits.
Lecture 3 hours; 3 credits. The content of this course focuses upon the structural and neurological bases of speech and language disorders, particularly those related to laryngeal and central nervous system pathologies.

CSD 561. Language Development and Language Disorders. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: CSD 553 or equivalent, or permission of the instructor. This course provides a detailed analysis of current literature pertinent to language development, diagnosis and intervention.

CSD 562. Articulation and Phonological Disorders. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: CSD 551. The principal emphasis of this course is clinical intervention for phonological and articulation disorders including motor speech disorders.

CSD 564. Advanced Clinical Techniques in Speech Pathology. 3 Credits.
Lecture 3 hours; 3 credits. This course emphasizes current techniques in the management of voice, language, stuttering and articulation disorders.

CSD 565. Cleft Palate. 3 Credits.
Lecture 3 hours; 3 credits. The purpose of this course is to investigate the etiologies, communicative disorders, diagnostic methods, and therapeutic techniques related to cleft palate and related disorders.

CSD 566. Theories and Therapies in Stuttering. 3 Credits.
Lecture 3 hours; 3 credits. This course emphasizes current etiological theories, research, diagnostic procedures and therapeutic techniques related to stuttering.

CSD 567. Aphasia. 3 Credits.
Lecture 3 hours; 3 credits. The objective of this course is to investigate the etiologies, communicative disorders, diagnostic methods and therapeutic techniques related to aphasia.

CSD 568. Swallowing Disorders. 3 Credits.
Lecture 3 hours; 3 credits. This course reviews the structures and neural bases of swallowing, common etiologies that cause dysphagia, and clinical techniques used in assessment and management of swallowing disorders in pediatric and adult populations.

CSD 660. Procedures in Audiology. 3 Credits.
Lecture 3 hours; 3 credits.

DANC - Dance

DANCE Courses

DANC 595. Topics in Dance. 1-3 Credits.
The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses appear in the course schedule, and are more fully described in a booklet distributed to academic advisors. Prerequisites: Appropriate survey course or permission of the instructor.

DANC 596. Topics in Dance. 1-3 Credits.
The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses appear in the course schedule, and are more fully described in a booklet distributed to all academic advisors. Prerequisites: Appropriate survey course or permission of the instructor.

DANC 597. Tutorial Work in Special Topics in Dance. 1-3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: graduate standing and approval of the department chair.

DANC 598. Tutorial Work in Special Topics in Dance. 1-3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: graduate standing and approval of the department chair.

DANC 697. Tutorial Work in Special Topics in Dance. 1-3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: Graduate standing and approval of the department chair.

DANC 698. Tutorial Work in Special Topics in Dance. 1-3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: Graduate standing and approval of the department chair.

DNTH - Dental Hygiene

DENTAL HYGIENE Courses

DNTH 512. Perspectives on Dental Hygiene Practice. 3 Credits.
Prerequisites: permission of the instructor. Course is designed for the licensed dental hygienist who seeks to maintain an awareness of changing trends, perspectives, evidence-based interventions and technologies in dental hygiene, health, and society that influence the dental hygiene process of care. (Offered summer.) Qualifies as a CAP experience.

DNTH 514. Educational Concepts for the Health Professional I. 3 Credits.
This course is designed to explore various educational concepts, principles and methods of teaching for adults. Students will learn to present educational information to a diverse client population, in a variety of settings, in an ethical and professional manner. Topics include, but are not limited to, objectives, planning, implementation and evaluation of instruction; instructional strategies; delivery models; presentation skills; and techniques for communicating health information. Prerequisites: permission of the instructor.
DNTH 515. Research Methods in the Health Sciences. 3 Credits.
Designed to develop skills in scientific methods, evidence based decision making, levels of evidence, and critical analysis of research findings. Emphasis on types of research, problem selection and hypothesis writing, research planning and design, data collection and measuring techniques, analysis and interpretation of data, research proposal writing and computer application. A written research proposal is required for graduate credit. (offered fall).

DNTH 516. Administrative Leadership and Professional Development. 3 Credits.
A study of current trends that influence the profession of dental hygiene including oral health care delivery, manpower, financing mechanisms, quality improvement, third party payers, professional associations, regulatory agencies and legislation. Emphasis is on ethical, political, and legal issues as they relate to the dental hygiene profession. (offered spring) Prerequisites: permission of the instructor.

DNTH 540. Telehealthcare Technology. 3 Credits.
Prerequisites: permission of the instructor. This course will examine the concept, global impact, and trends in telehealthcare technology on the client/patient, multidisciplinary practitioners, and various healthcare systems. Emphasis is on effective evidence-based decision making to reduce errors in patient care, promote care in remote or underserved geographical areas, and the ability to retrieve and evaluate healthcare information that improves access to quality, cost effective health care. (Offered spring, summer).

DNTH 597. Independent Study in Dental Hygiene. 1-6 Credits.
Independent reading and study on a topic selected under direction of a faculty member. (Offered fall, spring, summer) Prerequisites: permission of instructor.

DNTH 604. Clinical Administration and Teaching. 4 Credits.
Application of principles and theories of education and management to dental hygiene clinical education. Emphasis is on planning, implementing and evaluating clinical teaching; assessment of clinical competence; management of human and physical resources; and regulations affecting clinical education. (offered fall).

DNTH 611. Modeling and Simulation Applications in Healthcare. 3 Credits.
This course examines the principles and innovative applications for modeling and simulation in healthcare practice, research, education, and administration with emphasis on emerging issues and trends in technology. Topics include the selection and implementation of simulation technology in conceptual epidemiology public and environmental health, dental hygiene, dentistry, nursing, medicine, laboratory sciences, healthcare management and health information.

DNTH 650. Advanced International Dental Hygiene. 3-9 Credits.
Faculty-led experiences offer unique opportunities for students to travel abroad, develop cross cultural competence, experience global health challenges, and engage in projects that advance oral health worldwide. Prerequisites: DNTH 514.

DNTH 660. Educational Concepts for the Health Professional II. 3 Credits.
Explores instructional strategies and their application to contemporary health professional roles. Emphasis is on individuals as health care specialists in business and industry; professional, private and public organizations; higher education; and the health care industry. Topics include implementation and evaluation of instruction, roles and responsibilities of faculty within an accredited program affected by state and national standards, and ethical and career related issues and trends. Students are provided with practical experience in traditional and distance education instructional methods. (offered spring) Prerequisites: DNTH 514 or permission of the instructor.

DNTH 663. Interprofessional Health Promotion. 3 Credits.
Course brings together students from various health disciplines to learn each other’s roles and collaborate as a team using technology to promote health and prevent disease. Focus will be on optimizing health efforts and outcomes through an interprofessional approach that is guided by the research evidence and current technologies. Topics include Healthy People 2020 objectives, age, specific clinical guidelines for health promotion and illness prevention, theories on behavior and motivation, sociocultural issues, telehealth care, and various health problems. Evidence-based measures used by the team for promoting and maintaining health throughout the lifespan are emphasized.

DNTH 668. Internship. 3-9 Credits.
Experience-based learning activities designed to develop a role of competence related to the individual’s area of specialization while working under the supervision of a faculty member or host supervisor within an educational, health care, research, or corporate health setting. A clinical dental hygiene internship is prerequisite to DNTH 669. Available for pass/fail grade only. (offered fall, spring, summer) Prerequisites: DNTH 514, DNTH 515, DNTH 604 or permission of the instructor.

DNTH 695. Topics in Dental Hygiene. 1-6 Credits.
Advanced seminars on selected topics in dental hygiene. Topics vary by semester. offered fall, spring, summer).

DNTH 697. Independent Study-Dental Hygiene. 1-6 Credits.
Independent reading and study on a topic selected under direction of a faculty member. (offered fall, spring, summer).

DNTH 698. Research. 3 Credits.
An original thesis research project is executed with the major advisor and thesis committee guiding the student’s research project under supervision. A written research proposal must be submitted and approved prior to beginning the project. Required for students in the thesis option. Available as pass/fail grade only. (offered fall, spring, summer) Prerequisites: DNTH 515, FOUN 722 or MPH0 612.

DNTH 699. Thesis. 3 Credits.
Devoted to research, writing of the thesis, and scheduled conferences with the candidate’s advisor and thesis committee. Students must submit an acceptable written thesis demonstrating knowledge of problem selection, data classification, analysis and interpretation and defend it. Available as pass/fail grade only. (offered fall, spring) Prerequisites: DNTH 698.

ECE - Elect Computer Engineering

ELECT COMPUTER ENGINEERING Courses

ECE 503. Power Electronics. 3 Credits.
Power electronics provides the needed interface between an electrical source and an electrical load and facilitates the transfer of power from a source to a load by converting voltages and currents from one form to another. Topics include: alternating voltage rectification, Pulse Width Modulation (PWM), DC converters (Buck, Boost, Buck-Boost, Cuk and SEPIC converters), negative feedback control in power electronics, isolated switching mode power supply, flyback and forward power supply, solid state power switches, AC inverter.

ECE 504. Electric Drives. 3 Credits.
Electric drives efficiently control the torque, speed and position of electric motors. This course has a multi-disciplinary nature and includes fields such as electric machine theory, power electronics, and control theory. Topics include: switch-mode power electronics, magnetic circuit, DC motor, AC motor, Brushless DC motor, induction motor, speed control of induction motor, vector control of induction motor, stepper-motor.

ECE 506. Introduction to Visualization. 3 Credits.
Introduction to computer graphics and visualization with emphasis on using 3D application programmer’s interface (API) libraries. It covers mathematical foundations, rendering pipeline, geometrical transformations, 3D viewing and projections, shading, texture mapping, and programmable shaders. Various visualization applications are covered.
ECE 507. Introduction to Game Development. 3 Credits.
An introductory course focused on game development theory and practices using Microsoft XNA Game Studio with emphasis on educational game development. Topics covered include game architecture, computer graphics theory, user interface, audio, high level shading language, animation, physics, and artificial intelligence. Students will develop games related to science (e.g., physics, chemistry, and biology), technology, engineering, and mathematics (STEM) education. The developed games can run on a variety of platforms, including Microsoft Windows, Xbox 360, Windows Phone 7 and Zune Digital Media Player.

ECE 510. Model Engineering. 3 Credits.
The goal of this course is to develop understanding of the various modeling paradigms appropriate for capturing system behavior and conducting digital computer simulation of many types of systems. The techniques and concepts discussed typically include UML, concept graphs, Bayesian nets, Markov models, Petri nets, system dynamics, Bond graphs, etc. Students will report on a particular technique and team to implement a chosen system model. (cross-listed with MSIM 510).

ECE 541. Advanced Digital Design and Field Programmable Gate Arrays. 3 Credits.
Course will provide a description of FPGA technologies and the methods using CAD design tools for implementation of digital systems using FPGAs. It provides advanced methods of digital circuit design, specification, synthesis, implementation and prototyping. It introduces practical system design examples. (Offered spring).

ECE 543. Computer Architecture. 3 Credits.
An introduction to computer architectures. Analysis and design of computer subsystems including central processing units, memories and input/output subsystems. Important concepts include datapaths, computer arithmetic, instruction cycles, pipelining, virtual and cache memories, direct memory access and controller design. (offered fall) Prerequisites: ECE 341 and ECE 346.

ECE 551. Communication Systems. 3 Credits.
Fundamentals of communication systems engineering. Modulation methods including continuous waveform modulation (amplitude, angle). Design of modulation systems and the performance in the presence of noise. Communication simulation exercises through computer experiments. Prerequisites: ECE 304 and a grade of C or better in ECE 202.

ECE 552. Introduction to Wireless Communication Networks. 3 Credits.

ECE 554. Introduction to Bioelectric. 3 Credits.
Covers the electrical properties of cells and tissues as well as the use of electrical and magnetic signals and stimuli in the diagnosis and treatment of disease. Typical topics to be covered include basic cell physiology, endogenous electric fields in the body, electrocardiography, cardiac pacing, defibrillation, electrotherapy, electroporation, electrotherapy in wound healing. In addition, ultrashort electrical pulses for intracellular manipulation and the application of plasmas to biological systems will be covered.

ECE 555. Network Engineering and Design. 3 Credits.
Prerequisites: ECE 355 or permission of the instructor. Emphasis is on gaining an understanding of networking design principles that entails all aspects of the network development life cycle. Topics include campus LAN models and design, VLANs, internetworking principles and design, WAN design, design of hybrid IP networks, differentiated vs. integrated services, traffic flow measurement and management. (offered spring).

ECE 558. Instrumentation. 3 Credits.
Computer interfacing using a graphical programming language with applications involving digital-to-analog conversion (DAC), analog-to-digital conversion (ADC), digital input output (DIO), serial ports, and the general-purpose instrument bus (GPIB). Analysis of sampled data involving the use of the probability density function, mean and standard deviations, correlations, and the power spectrum. Students are required to do a semester-long project on LabVIEW implementation. (offered spring, summer) Prerequisites: PHYS 102N, PHYS 112N or PHYS 232N and a grade of C or better in ECE 202.

ECE 561. Automatic Control Systems. 3 Credits.

ECE 562. Introduction to Medical Image Analysis (MIA). 3 Credits.
Introduction to basic concepts in medical image analysis. Medical image registration, segmentation, feature extraction, and classification are discussed. Basic psychophysics, fundamental ROC analysis and FROC methodologies are covered.

ECE 572. Plasma Processing at the Nanoscale. 3 Credits.
The science and design of partially ionized plasma and plasma processing devices used in applications such as etching and deposition at the nanoscale. Gas phase collisions, transport parameters, DC and RF glow discharges, the plasma sheath, sputtering, etching, and plasma deposition. Prerequisites: ECE 323.

ECE 573. Solid State Electronics. 3 Credits.
The objective of this course is to understand basic semiconductor devices by understanding semiconductor physics (energy bands, carrier statistics, recombination and carrier drift and diffusion) and to gain an advanced understanding of the physics and fundamental operation of advanced semiconductor devices. Following the initial introductory chapters on semiconductor physics, this course will focus on p-n junctions, metal-semiconductor devices, MOS capacitors, MOS field effect transistors (MOSFET) and bipolar junction transistors. Prerequisites: ECE 313, ECE 323 and ECE 332.

ECE 574. Optical Fiber Communications. 3 Credits.
Electromagnetic waves; optical sources including laser diodes; optical amplifiers; modulators; optical fibers; attenuation and dispersion in optical fibers; photodetectors; optical receivers; noise considerations in optical receivers; optical communication systems. Prerequisites: ECE 323 and MATH 312.

ECE 578. Introduction to Lasers and Laser Applications. 3 Credits.
Introduction and review of electromagnetic theory; atomic physics and interactions of radiation with matter; two- and three-level systems, and rate equations; gain; single- vs. multimode; homogeneous and inhomogeneous broadening; Q-switching and mode-locking; semiconductor lasers; vertical cavity surface emitting lasers (VCSELs); Raman spectroscopy, remote sensing and ranging; holography; and laser ablation. Prerequisites: ECE 313 and MATH 312.

ECE 583. Embedded Systems. 3 Credits.
This course covers fundamentals of embedded systems: basic architecture, programming, and design. Topics include processors and hardware for embedded systems, embedded programming and real time operating systems.

ECE 595. Topics in Electrical and Computer Engineering. 1-3 Credits.
Topics in Electrical and Computer Engineering Prerequisites: departmental approval.

ECE 596. Topics in Electrical and Computer Engineering. 1-3 Credits.
Topics in Electrical and Computer Engineering Prerequisites: departmental approval.
ECE 601. Linear Systems, 3 Credits.
A comprehensive introduction to the analysis of linear dynamical systems from an input-output and state space point of view. Concepts from linear algebra, numerical linear algebra and linear operator theory are used throughout. Some elements of state feedback design and state estimation are also covered. Prerequisites: MATH 307.

ECE 606. Visualization I, 3 Credits.
Prerequisites: Linear Algebra, C and C++ programming. Practical treatment of visualization and computer graphics with emphasis on usage of application programming interface (API) libraries. It covers mathematical foundations, rendering pipeline, geometrical transformations, 3D viewing and projections, shading, texture mapping, programmable shaders, scene graph, procedural methods and physical methods.

ECE 607. Machine Learning I, 3 Credits.
Course provides a practical treatment of design, analysis, implementation and applications of algorithms. Topics include multiple machine learning models: linear models, neural networks, support vector machines, instance-based learning, Bayesian learning, genetic algorithms, ensemble learning, reinforcement learning, unsupervised learning, etc. Prerequisites: Graduate Standing.

ECE 611. Numerical Methods in Engineering Analysis, 3 Credits.
Course intended to provide graduate students in Electrical and Computer Engineering with a basic knowledge of numerical methods in the areas of Physical Electronics and Systems Engineering. Topics will include: Discretization and truncation errors, Numerical integration, Solution of non-linear equations, Matrix methods, Ordinary and partial differential equations, Finite difference methods, Numerical stability, Simulation for stochastic processes, and other aspects of special interest to graduate students in the class.

ECE 612. Digital Signal Processing I, 3 Credits.
Prerequisites: ECE 381 or equivalent. This course will present the fundamentals of discrete-time signal processing. Topics will include time domain signals and discrete-time linear systems, continuous-time signal sampling and reconstructions, the Discrete Fourier Transform (DFT), the Z-transform, FIR and IIR digital filter design, and digital filter implementations. Applications and examples of DSP usage will be discussed. Problem solving using MATLAB is required.

ECE 623. Electromagnetism, 3 Credits.
Review of electrostatic and magnetostatic concepts, time varying field, Maxwell’s equations, plane wave propagation in various media, transmission lines, optical wave guides, resonant cavities, simple radiation systems, and their engineering applications. Prerequisites: ECE 323 or equivalent.

ECE 642. Computer Networking, 3 Credits.
The course is based on the ISO (International Standard Organization) OSI (Open Systems Interconnection) reference model for computer networks. A focus is placed on the analysis of protocols at different layers, network architectures, and networking systems performance analysis. Current topic areas include LANs, MANs, TCP/IP networks, mobile communications, and ATM. Prerequisites: ECE 455 or ECE 555 or permission of the instructor.

ECE 643. Computer Architecture Design, 3 Credits.
Digital computer design principles. The course focuses on design of state-of-the-art computing systems. An emphasis is placed on superscalar architectures focusing on the pipelining and out-of-order instruction execution operations. Prerequisites: ECE 443 or ECE 543.

ECE 648. Advanced Digital Design, 3 Credits.
This course introduces methods for using high level hardware description language such as VHDL and/or Verilog for the design of digital architecture. Topics include top-down design approaches, virtual prototyping, design abstractions, hardware modeling techniques, algorithmic and register level design, synthesis methods, and application decomposition issues. Final design project is required. Prerequisites: ECE 341.
ECE 751. Biostatistics: Fundamentals and Applications. 3 Credits.
Descriptive statistics, probability distributions and computations, estimation, hypothesis testing (one- and two-sample inferences), regression methods (simple and multiple), methods for analyzing categorical data (Fisher’s exact test, McNemar’s test, chi-square tests, Cochran-Mantel-Haenszel methods), analysis of variance including non-parametric alternatives, multi-sample inference. Appropriate examples will be given from health sciences and biomedical engineering.

ECE 762. Digital Control Systems. 3 Credits.
Mathematical representation, analysis, and design of discrete-time and sampled-data control systems. Topics include transfer function and state space representations, stability, the root locus method, frequency response methods, and state feedback. Prerequisites: ECE 461 or ECE 561, ECE 381 and ECE 601.

ECE 763. Multivariable Control Systems. 3 Credits.
A comprehensive introduction to techniques applicable in control of complex systems with multiple inputs and outputs. Both the frequency domain and state variable approaches are utilized. Special topics include robust and optimal control. Prerequisites: ECE 461 or ECE 561 and ECE 601.

ECE 766. Nonlinear Control Systems. 3 Credits.
An introduction to mathematical representation, analysis, and design of nonlinear control systems. Topics include phase-plane analysis, Lyapunov stability theory for autonomous and nonautonomous systems, formal power series methods and differential geometric design techniques. Prerequisites: ECE 461 or ECE 561 and ECE 601.

ECE 771. Analog VLSI. 3 Credits.
A survey of some fundamental topics in analog VLSI including current mirrors, amplifiers, frequency response, noise, feedback, stability, and operational amplifiers. Projects on design of CMOS operational amplifiers including the use of Cadence design tools for simulation and layout. Students are expected to have some knowledge or experience with analog electronics. Prerequisites: ECE 313.

ECE 772. Fundamentals of Solar Cells. 3 Credits.
The course provides an overview of the fundamentals of solar cell technologies, design, and operation. The course is designed for graduate students in Engineering and Science interested in the field of alternative energy. The course objectives are to make sure each student: understands the various forms of alternative energies, understands solar cell design, understands solar cell operation, and acquires knowledge of the various solar cells technologies. The topics to be covered include: Alternative energies; Worldwide status of Photovoltaics; Solar irradiance; Review of semiconductor properties; Generation, recombination; Basic equations of device physics; p-n junction diodes; Ideal solar cells; Efficiency limits; Efficiency losses and measurements; Module fabrication; c-Si technology; classical; Photovoltaic systems; Design of stand-alone system; Residential PV systems. Prerequisites: Graduate standing in Engineering and Science.

ECE 773. Introduction to Nanotechnologies. 3 Credits.
This course will introduce the rapidly emerging field of nanotechnology with special focus on underlying principles and applications relevant to the nanoscale dimensions. Specifically, this course will cover (1) the basic principles related to synthesis and fabrication of nanomaterials and nanostructures, (2) zero-, one-, two- and three-dimensional nanomaterials, (3) characterization and properties of nanomaterials, and (4) application of nanoscale devices.

ECE 774. Semiconductor Characterization. 3 Credits.
Introduction of basic methods for semiconductor material and device characterization. Topics include resistivity, carrier doping concentration, contact resistance, Schottky barrier height, series resistance, channel length, threshold voltage, mobility, oxide and interface trapped charge, deep level impurities, carrier lifetime, and optical, chemical and physical characterization. Prerequisites: ECE 473 or ECE 473 or equivalent.

ECE 775. Non-thermal Plasma Engineering. 3 Credits.
This course covers the fundamental principals governing low temperature plasma discharges and their applications. First the fundamental properties of plasmas are introduced. These include the kinetic theory of gases, collisional processes, and plasma sheaths. Then in-depth coverage of the physical mechanisms underlying the operation of non-equilibrium plasma discharges in presented, including important characteristics such as their ignition, evolution, and eventual quenching. Finally, practical applications of non-thermal plasmas, including applications in biology and medicine, are presented.

ECE 777. Semiconductor Process Technology. 3 Credits.
Theory, design and fabrication of modern integrated circuits that consist of nano scale devices and materials. Topics include crystal growth and wafer preparation process including epitaxy, thin film deposition, oxidation, diffusion, ion implantation, lithography, dry etching, VLSI process integration, diagnostic assembly and packaging, yield and reliability. Prerequisites: ECE 473 or ECE 573.

ECE 780. Machine Learning II. 3 Credits.
Advanced topics in machine learning and pattern recognition systems. Data reduction techniques including principle component analysis, independent component analysis and manifold learning. Introduction to sparse coding and deep learning for data representation and feature extraction.

ECE 782. Digital Signal Processing II. 3 Credits.
Prerequisites: ECE 612 or equivalent. Review of time domain and frequency domain analysis of discrete time signals and systems. Fast Fourier Transforms, recursive and non-recursive digital filter analysis and design, multirate signal processing, optimal linear filters, and power spectral estimation.

ECE 783. Digital Image Processing. 3 Credits.
Principles and techniques of two-dimensional processing of images. Concepts of scale and spatial frequency. Image filtering in spatial and transform domains. Applications include image enhancement and restoration, image compressing, and image segmentation for computer vision. Prerequisites: ECE 381 or ECE 612 or ECE 782 or ECE 882.

ECE 784. Computer Vision. 3 Credits.
Principles and applications of computer vision, advanced image processing techniques as applied to computer vision problems, shape analysis and object recognition.

ECE 787. Digital Communications. 3 Credits.
Fundamental concepts of digital communication and information transmission: information sources and source coding; orthonormal expansions of signals, basis functions, and signal space concepts; digital modulation techniques including PAM, QAM, PSK and FSK; matched filters, demodulation and optimal detection of symbols and sequences; bandwidth; mathematical modeling of communication channels; channel capacity. Prerequisites: ECE 451/ECE 551 or equivalent or permission of the instructor.

ECE 795. Topics in Electrical and Computer Engineering. 3 Credits.
Topics in Electrical and Computer Engineering Prerequisites: departmental approval.

ECE 796. Topics in Electrical and Computer Engineering. 3 Credits.
Study of selected topics in Electrical and Computer Engineering. Prerequisites: departmental approval.

ECE 797. Independent Study. 3 Credits.
This course allows students to develop specialized expertise by independent study (supervised by a faculty member) Prerequisites: departmental approval.

ECE 831. Graduate Seminar. 1 Credit.
Graduate seminar presentations concerning technical topics of current interest given by faculty and invited speakers.
This is an advanced level course in data communications. A focus is placed on the analysis, modeling, and control of computer communication systems. Topics include packet switched networks, circuit switched networks, ATM networks, network programming, network control and performance analysis, network security, and wireless sensor networks. Prerequisites: ECE 462 or permission of instructor.

ECE 851. Biostatistics: Fundamentals and Applications. 3 Credits.
Prerequisites: ECE 304 or equivalent. Descriptive statistics, probability distributions and computations, estimation, hypothesis testing (one- and two-sample inferences), regression methods (simple and multiple), methods for analyzing categorical data (Fisher’s exact test, McMenar’s test, chi-square tests, Cochran-Mantel-Haenszel methods), analysis of variance including non-parametric alternatives, multi-sample inference. Appropriate examples will be given from health sciences and biomedical engineering.

ECE 862. Digital Control Systems. 3 Credits.
Mathematical representation, analysis, and design of discrete-time and sampled-data control systems. Topics include transfer function and state space representations, stability, the root locus method, frequency response methods, and state feedback. Prerequisites: ECE 461 or ECE 561, ECE 381 and ECE 601.

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ECE 877. Semiconductor Process Technology. 3 Credits.
Theory, design and fabrication of modern integrated circuits that consist of nano scale devices and materials. Topics include crystal growth and wafer preparation process including epitaxy, thin film deposition, oxidation, diffusion, ion implantation, lithography, dry etching, VLSI process integration, diagnostic assembly and packaging, yield and reliability. Prerequisites: ECE 473 or ECE 573.

ECE 880. Machine Learning II. 3 Credits.
Advanced topics in machine learning and pattern recognition systems. Data reduction techniques including principle component analysis, independent component analysis and manifold learning. Introduction to sparse coding and deep learning for data representation and feature extraction.

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Prerequisites: ECE 612 or equivalent. Review of time domain and frequency domain analysis of discrete time signals and systems. Fast Fourier Transforms, recursive and non-recursive digital filter analysis and design, multirate signal processing, optimal linear filters, and power spectral estimation.

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Fundamental concepts of digital communication and information transmission: information sources and source coding; orthonormal expansions of signals, basis functions, and signal space concepts; digital modulation techniques including PAM, QAM, PSK and FSK; matched filters, demodulation and optimal detection of symbols and sequences; bandwidth; mathematical modeling of communication channels; channel capacity. Prerequisites: ECE 451/ECE 551 or equivalent or permission of the instructor.

ECE 895. Topics in Electrical and Computer Engineering. 3 Credits.
Topics in Electrical and Computer Engineering Prerequisites: departmental approval.

ECE 896. Topics in Electrical and Computer Engineering. 3 Credits.
Topics in Electrical and Computer Engineering.

ECE 897. Independent Study. 3 Credits.
This course allows students to develop specialized expertise by independent study (supervised by a faculty member) Prerequisites: departmental approval.
ECON 502. Transportation Economics. 3 Credits.
A survey of the transportation system in the United States including its development, pricing, and regulation. Special attention is given to railroads, highways, pipeline, water and air transportation; and the roles that these modes of transportation play in economic development.

ECON 507. Labor Market Economics. 3 Credits.
Economic analysis of various facets of labor markets. Emphasis is placed on the analysis of labor supply, labor demand, wage determination, earnings differentials and inequality, occupational choice, human capital investment, labor market discrimination, mobility and immigration, impact of unions, and unemployment.

ECON 513. Econometrics. 3 Credits.

ECON 521. Public Economics. 3 Credits.
This course examines the interaction between government and the economy, with particular emphasis on the role of the federal government. Topics that address the motivation for government involvement in the economy include market failure, income inequality, and redistribution of income. Specific programs studied include Medicare/Medicaid, welfare programs, and the social security system.

ECON 525. Introduction to Mathematical Economics. 3 Credits.
The course focus is on the use of differential and integral calculus, matrix algebra, difference equations and classical optimization theory in the presentation and development of economic theory.

ECON 527. Industrial Organization and Public Policy. 3 Credits.
A study of market structures and the conduct and performance of business firms in different market structures. The emphasis is on the theory and measurement of industrial concentration and public policy responses to industrial concentration.

ECON 531. Money and Banking. 3 Credits.
Examines the nature and functions of money and credit, the commercial banking system, the Federal Reserve System, the quantity theory of money, the theory of income determination, the balance of payments and exchange rates, and the history of monetary policy in the United States.

ECON 535. Health Economics: A Global Perspective. 3 Credits.
This course introduces the student to the economics of health care and the application of health economics to health care problems, the issues surrounding those problems, and the potential solutions to those problems. The course will emphasize institutional features of the health care industry, the market for health care, the political economy of health care, and government involvement in the delivery of health care. Further, the course will survey the delivery of health care in other countries and provide a global perspective on selected health care issues such as AIDS, water and air quality, and the aging of the population.

ECON 544. Development of the American Economy. 3 Credits.
A study of the economic development of the United States from colonial times to the present. An analytical course concerned with the application of economic theory in the study of the growth and development of the American economy.

ECON 545. Urban Economics. 3 Credits.
An analysis of the economic factors which give rise to the formation of urban centers and which contribute to the following problems: urban poverty, housing conditions, traffic congestion, and the fiscal crisis faced by modern cities.

ECON 547. Natural Resource and Environmental Economics. 3 Credits.
Topics discussed include conservation and scarcity, market failure, fishery management, benefit-cost analysis, water resource development, environmental quality, recreation, energy, and marine resources.

ECON 551. History of Economic Thought. 3 Credits.
A study of the history of economic theory with attention to the economic ideas and philosophy of Adam Smith, David Ricardo, Karl Marx, J.M. Keynes and other major figures in the development of economics.

ECON 554. Economic Development. 3 Credits.
This course is intended to provide an introduction to the problems of economic development in the Third World, including the problems of economic growth, income distribution, poverty, urbanization, uneven development, agricultural policy, economic planning, industrial policy, trade policy, balance of payments, finance, and currency crises. To illustrate these issues we will examine the problems of certain individual countries, such as Brazil, Korea, Philippines, India, Mexico, Kenya, Indonesia, and Thailand. In the course we try to strike a balance between economic theory and institutional economics.

ECON 555. Comparative Economic Systems. 3 Credits.
This course examines and compares different economies from around the world, including such economies as the UK, France, Germany, Sweden, Japan, India, Korea, Russia, and China. Students look at the economic growth, GDP per capita, unemployment, inflation, income distribution, economic efficiency, institutions, policies, industrial structure, legal infrastructure, and international trade of these economies. Students study the functioning of markets and the problems of market and government failure. The course addresses the question, what is the best way to organize society?.

ECON 556. Economics of Information, the Internet and E-Commerce. 3 Credits.
Outlines the economic principles of information that underpin the Internet and e-commerce. Considers auctions, economies of scale and scope, data mining, price discrimination, product bundling, versioning, networking, the diffusion of innovations and intellectual property as they are utilized on the Internet and in e-commerce. Taught in a microcomputer laboratory.

ECON 595. Selected Topics in Economics. 1-3 Credits.
Taught on an occasional basis. A study of selected topics, the title of which will appear in the course schedule. Prerequisites: Permission of the instructor.

ECON 604. Managerial Economics and International Trade. 3 Credits.
Demand and supply, theory of optimizing behavior, demand elasticity, demand forecasting, production, costs, pricing with market power, multiple plants, markets and products, profit maximization, uncertainty, international trade and tariffs. (Credit may not be applied toward the M.A. in Economics.) Pre- or corequisite: BNAL 600 or URBN 606.

ECON 612. Global and Applied Macroeconomics. 3 Credits.
Measurements and indicators of economic activity; short-run macroeconomic analysis, credit markets, demand for money, institutional factors in money and banking, money creation, and monetary policy; long-run macroeconomics, short-run macroeconomic comparative statics, foreign exchange markets; description and history of business cycles, inflation, economic growth and public policies. (Credit may not be applied toward the M.A. in economics.) Prerequisites: ECON 604.

ECON 625. Mathematical Economics. 3 Credits.
This course focuses on the use of mathematical techniques in solving complex economic problems. Primary emphasis is given to matrix algebra, differential calculus, constrained optimization techniques and dynamic optimization techniques. Prerequisites: ECON 604 or ECON 612 or ECON 650.
### ECON 650. International Economics. 3 Credits.
An analysis of international trade theory, commercial policy, foreign exchange markets, open economy macroeconomics, and balance of payments. The course provides the theoretical basis to understand contemporary international economic issues. (Credit may not be applied toward the M.A. in economics.).

### ECON 668. Economics Internship. 3 Credits.
The course is a practicum in the field of economics applying theories, concepts, and quantitative tools in a professional environment. Prerequisites: Twelve hours of economics and permission of the graduate program director.

### ECON 695. Selected Topics in Economics. 1-3 Credits.
Advanced topics in economics specifically designed for school teachers. (Credit may not be applied toward the M.A. in economics or the MBA.) Prerequisites: Permission of the instructor.

### ECON 696. Selected Topics in Economics. 1-3 Credits.
Advanced topics in economics are covered in this course.

### ECON 697. Readings in Economics. 3 Credits.
Individual readings in a selected field under the direction of a faculty member of the department.

### ECON 698. Economic Methodology and Research. 3 Credits.
Individual research under the direction of a faculty member of the department.

### ECON 699. Thesis. 6 Credits.
Directed research for thesis.

### ECON 701. Advanced Economic Analysis: Microeconomics. 3 Credits.
Concepts and techniques of modern microeconomic theory, development in the theory of utility and demand, theory of the firm and market, partial and general equilibrium analysis. Prerequisites: ECON 604 or equivalent. Pre- or corequisite: ECON 625.

### ECON 702. Advanced Economic Analysis: Macroeconomics. 3 Credits.
Study of income, employment, the price level, money, and the effect of government policy under static and dynamic conditions. Mainstream and alternative theories considered. Prerequisites: ECON 612 or equivalent. Pre- or corequisite: ECON 625.

### ECON 706. Econometrics I. 3 Credits.
Single-equation econometric models; serial correlation, heteroscedasticity, specification error, missing observations, and errors-in-variables and forecasting. Prerequisites: ECON 604 or equivalent and ECON 612 or equivalent. Pre- or corequisite: ECON 625.

### ECON 707. Econometrics II. 3 Credits.
Multi-equation econometric models; problems such as identification, single-equation estimation, estimation of equation systems, and model evaluation techniques; time-series models such as autoregressive and moving average models; forecasting with time-series models. Prerequisites: ECON 604 or equivalent and ECON 612 or equivalent. Pre- or corequisite: ECON 625.

### ECON 708. Econometrics III. 3 Credits.
Issues in cross-section and panel data, focuses on problems such as selection bias, heterogeneity, unobserved heterogeneity, treatment effects, truncation and censoring. The course covers multivariate techniques such as principal component analysis and factor analysis, along with event studies and nonparametric and semiparametric estimators. Prerequisites: ECON 707 or equivalent.

### ECON 752. International Trade. 3 Credits.
Pure theory of international trade, mathematical models of trade, instruments of trade policy, theory and practice of economic integration, trade liberalization issues from international and regional viewpoints. Prerequisites: ECON 604 or ECON 650 or equivalent.

### ECON 753. International Finance. 3 Credits.
International capital flows, exchange rates and price level, income, money supplies, inflation, international liquidity, causes of international balance and imbalance, balance-of-payments adjustments. Monetary magnitudes as a basis for insight into international financial policies. Prerequisites: ECON 612 or ECON 650 or equivalent.

### ECON 754. Economic Development. 3 Credits.
Introduction to the problems of economic development in the third world, including the problems of economic growth, income distribution, poverty, urbanization, uneven development, agricultural policy, economic planning, industrial policy, trade policy, balance of payments, finance, and currency crises. Prerequisites: ECON 604 or ECON 650.

### ECON 795. Selected Topics in Economics. 1-3 Credits.
Prerequisites: Ph.D. standing and permission of the chair and coordinator. Designed to provide the advanced student with an opportunity to study independently or in small groups and investigate specific topics of current interest in the field of economics.

### ECON 801. Advanced Economic Analysis: Microeconomics. 3 Credits.
Concepts and techniques of modern microeconomic theory, development in the theory of utility and demand, theory of the firm and market, partial and general equilibrium analysis. Prerequisites: ECON 604 or equivalent. Pre- or corequisite: ECON 625 or equivalent.

### ECON 803. Advanced Economic Analysis: Macroeconomics. 3 Credits.
Study of income, employment, the price level, money, and the effect of government policy under static and dynamic conditions. Mainstream and alternative theories considered. Prerequisites: ECON 612 or equivalent. Pre- or corequisite: ECON 625.

### ECON 806. Econometrics I. 3 Credits.
Single-equation econometric models; serial correlation, heteroscedasticity, specification error, missing observations, and errors-in-variables and forecasting. Prerequisites: ECON 604 or equivalent and ECON 612 or equivalent. Pre- or corequisite: ECON 625.

### ECON 807. Econometrics II. 3 Credits.
Multi-equation econometric models; problems such as identification, single-equation estimation, estimation of equation systems, and model evaluation techniques; time-series models such as autoregressive and moving average models; forecasting with time-series models. Prerequisites: ECON 606 or equivalent.

### ECON 808. Econometrics III. 3 Credits.
Issues in cross-section and panel data, focuses on problems such as selection bias, heterogeneity, unobserved heterogeneity, treatment effects, truncation and censoring. The course covers multivariate techniques such as principal component analysis and factor analysis, along with event studies and nonparametric and semiparametric estimators. Prerequisites: ECON 807 or equivalent.

### ECON 852. International Trade. 3 Credits.
Pure theory of international trade, mathematical models of trade, instruments of trade policy, theory and practice of economic integration, trade liberalization issues from international and regional viewpoints. Prerequisites: ECON 604 or ECON 650 or equivalent.

### ECON 853. International Finance. 3 Credits.
International capital flows, exchange rates and price level, income, money supplies, inflation, international liquidity, causes of international balance and imbalance, balance-of-payments adjustments. Monetary magnitudes as a basis for insight into international financial policies. Prerequisites: ECON 612 or ECON 650 or equivalent.

### ECON 854. Economic Development. 3 Credits.
Introduction to the problems of economic development in the third world, including the problems of economic growth, income distribution, poverty, urbanization, uneven development, agricultural policy, economic planning, industrial policy, trade policy, balance of payments, finance, and currency crises. Prerequisites: ECON 604 or ECON 650.

### ECON 895. Selected Topics in Economics. 1-3 Credits.
Prerequisites: Ph.D. standing and permission of the chair and coordinator. Designed to provide the advanced student with an opportunity to study independently or in small groups and investigate specific topics of current interest in the field of economics.

### ECON 999. Economics 999. 1 Credit.
This is registration required of all graduate students who must maintain active status at the university prior to graduation.
ELS - Educ Leadership Services

EDUC LEADERSHIP SERVICES Courses

ELS 596. Topics in Education. 1-3 Credits.

ELS 597. Topics in Education. 1-3 Credits.
1-3 credits each semester. Prerequisite: permission of the instructor. The College of Education offers selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly.

ELS 598. Topics in Education. 1-3 Credits.
1-3 credits each semester. Prerequisite: permission of the instructor. The College of Education offers selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly.

ELS 600. Principal Orientation and Instructional Leadership. 3 Credits.
Lecture 3 hours; 3 credits. An introduction to educational leadership to develop a capacity for reflective practice which unifies theory and knowledge for the improvement of instruction. Students will begin to understand their leadership potential through reflection, self-analysis, and instructor feedback via diagnostic assessment and case studies for principals. Students develop an administrative portfolio skills assessment. Required entry level course.

ELS 610. School Community Relations and Politics. 3 Credits.
Lecture 3 hours; 3 credits. Pre- or Corequisite: ELS 600. An introduction for prospective administrators to the social, political context in which they work. Emphasis will be placed on: understanding and using leadership skills in designing programs around the needs and problems of the school and its special publics; relating with the media; improving communication skills; and using skills in negotiations and conflict management.

ELS 621. Curriculum Development and Assessment. 3 Credits.
Lecture 3 hours; 3 credits. Pre- or Corequisite: ELS 600. A course designed to create a basic understanding of the comprehensive nature of the curriculum development process K-12, from a school leadership perspective. Students will explore theoretical, strategic, and organizational issues associated with curriculum development including multiculturalism, cognitive development, curricular patterns and connections, and assessment and evaluation.

ELS 623. Design of Service Delivery Plans to Meet the Needs of Military Connected Children and Families. 4 Credits.
Lecture, 3 hours; Service Learning, 1 hour. 4 credits. Prerequisite: COUN 605 and FOUN 662 and acceptance into the Military Child and Family Education Certificate Program. Students will apply their foundational and assessment knowledge for supporting military students to a capstone project in service delivery program design. This course will engage participants in surveying and considering a range of services, program elements, and strategies that may be employed to improve educational, social, and emotional school experiences for children of military-related families. Participants will engage in processes for selecting and preparing to implement optimal support strategies and structures to meet the identified needs of military students in their school setting. They will become familiar with and prepared to craft specific plans to utilize, for the benefit of military children, their peers and families: (a) various school, community, and government services; (b) classroom- and school-based programs designed to improve academic achievement and/or emotional well-being; and (c) classroom- and school-based strategies for designing and implementing programs and services that meet the needs of these children and their families. This course is required for completion of the Military Child and Family Education graduate certificate. Students must be accepted into the certificate program or receive approval from the certificate program director in order to enroll.

ELS 626. Instructional Supervision, Staff Development, and Assessment. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: ELS 610 and ELS 621. Pre- or Corequisite: ELS 600. Through site-based projects, scripts, enactments, case study analysis, and reflection, course participants apply theories and best practices to develop the skills and strategies that leaders use with individuals and groups to facilitate excellence in teaching and learning.

ELS 657. Public School Law. 3 Credits.
Lecture 3 hours; 3 credits. Pre- or Corequisite: ELS 600. This course is an introduction to law, particularly with respect to federal and state statutes and court decisions dealing with the public schools. The topics span the full spectrum of law-related concerns. By necessity, it is first a theoretical course; however, the outcomes are intended to be practical by providing the legal understanding necessary for a school administrator to negotiate his or her way through the maze of difficult legal matters commonly faced each day by school and district leaders.

ELS 660. Program Evaluation, Research and Planning. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ELS 600. In this course principal licensure candidates learn to identify organizational needs, develop research-based strategies to address those needs, and use data-driven planning to implement, monitor, and manage processes involved in implementing change strategies.

ELS 667. Cooperative Education. 1-3 Credits.
ELS 668. Internship in Educational Leadership. 3-6 Credits.
3-6 credits. Prerequisite: ELS 600 and ELS 669, passing scores on the appropriate PRAXIS II content examination or permission of instructor. The university and site supervisor will work with the educational leadership candidate in PreK through 12 and central office settings to provide the candidate with appropriate experiences to demonstrate competencies required by the Educational Leadership Constituent Council and the Virginia Department of Education.

ELS 669. Instructional Internship. 3 Credits.
Title credits 20 hrs; 3 credits. Prerequisite: ELS 673. Each internship course will require students to complete a minimum of 160 hours in each course. Course is designed to provide field experiences which will prepare them to serve as instructional and curriculum leadership in K-12 environments. Student must produce 1) a portfolio with required artifacts; 2) prepare a 10-12 reflective paper according to identified guidelines and 3) complete internship evaluation with mentor and college supervisor at least three times during the term.

ELS 673. Critical Issues Research. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: ELS 600, ELS 610, ELS 621, ELS 626, and ELS 660. The student completes an in-depth study of a critical issue in his/her profession and documents the work in a critical issue paper. Student must be able to demonstrate written and oral communication skills and critical and analytical skills in dealing with a major issue in educational leadership. Course to be taken near completion of program.

ELS 697. Topics in Educational Leadership. 1-6 Credits.
1-6 credits. The study of selected topics in educational leadership. Arranged individually with students.

ELS 700. Leadership and Management for School Improvement. 3 Credits.
This course is designed to give students entering the ODU Licensure program an understanding of the complex roles and challenges of a school principal, while focusing on the constantly changing nature of administrative responsibility. Students develop an integrated view of the knowledge base, research and practice of administration within a context of multiple perspectives and a wide range of thinking. The purpose of the course is to increase understanding of education, the role of educational administration, the forces that are moving education into a new era, the transitions that are occurring, and the use of the latest, best practices to improve the education of all children.
ELS 701. Accountability and Organizational Improvement. 3 Credits.
This course is an in-depth study of effective data based decision-making practices for contemporary school leaders. Formative and summative data based decision making practices will be explored, as well as how to work with large and small groups of staff members to analyze multiple measures of data and create school improvement designs for student and school success. An emphasis is placed on using data to make decisions at the division, school, and classroom levels. Prerequisite: ELS 700.

ELS 702. Educational Politics and Policymaking. 3 Credits.
This course teaches aspiring school leaders how politics and policy shape school-based decision making and how school leaders can influence politics and policy processes to improve learning environments for children. The course focuses contemporary problems that confront school leaders as they work to improve the conditions of learning for their students, faculty and staff. To effectively address and solve problems school leaders need to understand the processes of policymaking at various educational levels and to develop the relevant skills of policymaking needed at the school level. Thus, this course addresses the following three essential principles of educational politics and policy as they apply to school level administrators: political and policy dynamics that influence their work in schools; accurately identify, diagnose, and develop the right solutions to the right problems in order to achieve instructional goals of the school and division; and confront, engage in, and effectively deal with conflict (i.e., politics) emanating from within the school, division, or community in order to achieve school and division learning goals. Prerequisite: ELS 700.

ELS 710. Strategic Communication and External Relations. 3 Credits.
This course serves as an introduction for prospective administrators to the social and political context of the educational environment. The underlying concept of this course is collaboration. Today’s administrators face a variety of multifaceted challenges in their daily routines. Therefore, they must recognize the impact of political, socioeconomic situations, community diversity, equity issues, and school community relations on their leadership practices. Prerequisite: ELS 700.

ELS 727. Learning Theories and Professional Development. 3 Credits.
This course exposes students to the essential elements of instructional leadership. Central to the skills and knowledge necessary to be an effective instructional leader are a deep understanding of the learning sciences that inform us about the essence of effective teaching. Effective instructional leaders have a solid basis for assessing and promoting high quality instruction, giving them the tools to proactively build a school’s organizational capacity of sustained growth in student achievement. Students will engage in reading, reflection, dialog, writing, problem solving and field-work, designed to build an understanding of how these topics are intrinsically tied to supporting teachers in their classrooms through facilitating better understandings of standards and accountability, effective lesson planning and curriculum development, assessment and grading, classroom management and discipline. Prerequisite: ELS 700.

ELS 728. Instructional Leadership and Supervision. 3 Credits.
This course develops student’s skills, knowledge and dispositions in the area of instructional leadership. Students will explore how effective instructional leaders can use their integrated knowledge of quality instruction and the core principles of learning to set the mission and vision for the school, facilitate school improvement planning and professional development and finally how instructional supervision is used to integrate these activities and support the growth of individual teachers as well as building organizational capacity. Effective instructional leaders have a solid basis for assessing and promoting high quality instruction, giving them the tools to proactively build a school’s organizational capacity for sustained growth in student achievement. Students will engage in reading, reflection, dialog, writing, problem solving and field-work, designed to help them build an integrated understanding of those leadership practices that help support teacher instructional growth and those that build organizational capacity for sustained improvement. Prerequisite: ELS 700.

ELS 753. Educational Finance and Budgeting. 3 Credits.
This course examines how public schools are financed, including an analysis of the sources of revenues, the distribution of revenue, and the budgeting and expenditure of revenue. Special emphasis will be placed on the Virginia funding formula, education as an investment in human capital, and how funding relates to student achievement. Students will learn the fiscal management skills and understandings necessary to manage the finances of a school or school system, including the study of system and school procedures related to budget planning, budget management, internal school account management, inventory control, and purchasing procedures. Prerequisite: ELS 700.

ELS 754. Human Resource Development and Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ELS 600. This course focuses on the development of various staff personnel functions. Collaborative staff development and performance evaluation are linked to organizational goals, culture and learner achievement. Application of knowledge and skills via case study, simulation and oral and written demonstration projects is included.

ELS 755. Educational Law and Ethics. 3 Credits.
This course is an introduction to law, particularly with respect to federal and state statutes and court decisions dealing with the public schools. The topics span a wide spectrum of law-related concerns. The study of law is intended to be practical by providing the legal understanding necessary for a school administrator to negotiate his or her way through the maze of difficult legal and ethical matters commonly faced each day. Prerequisite: ELS 700.

ELS 764. History and Philosophy of American Public School Reform. 3 Credits.
Lecture 3 hours; 3 credits. This course covers the major historical movements, especially in school reform, and key American educational philosophers. This course will provide prospective school administrators with a historical and philosophical foundation of education.

ELS 787. Pupil Personnel Services for Diverse Populations. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ELS 600. This course focuses on the theories and skills that leaders need in order to administer the broad array of special services (i.e., special education, bilingual programming, counseling, and psychological, social work, and therapy services) so that students with all diverse needs are included in regular education.

ELS 795. Topics in Educational Leadership. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

ELS 797. Topics in Educational Leadership. 1-3 Credits.

ELS 800. Strategic Leadership and Management for School Improvement. 3 Credits.
This course is designed to give students entering the ODU Licensure program an understanding of the complex roles and challenges of a school principal, while focusing on the constantly changing nature of administrative responsibility. Students develop an integrated view of the knowledge base, research and practice of administration within a context of multiple perspectives and a wide range of thinking. The purpose of the course is to increase understanding of education, the role of educational administration, the forces that are moving education into a new era, the transitions that are occurring, and the use of the latest, best practices to improve the education of all children.

ELS 801. Accountability and Organizational Improvement. 3 Credits.
This course is an in-depth study of effective data based decision-making practices for contemporary school leaders. Formative and summative data based decision making practices will be explored, as well as how to work with large and small groups of staff members to analyze multiple measures of data and create school improvement designs for student and school success. An emphasis is placed on using data to make decisions at the division, school, and classroom levels. Prerequisite: ELS 700/800.
ELS 802. Educational Politics and Policymaking. 3 Credits.
This course teaches aspiring school leaders how politics and policy shapes school-based decision making and how school leaders can influence politics and policy processes to improve learning environments for children. The course focuses on contemporary problems that confront school leaders as they work to improve the conditions of learning for their students, faculty, and staff. To effectively address and solve problems school leaders need to understand the processes of policymaking at various educational levels and to develop the relevant skills of policymaking needed at the school level. Thus, this course addresses the following three essential principles of educational politics and policy as they apply to school level administrators: political and policy dynamics that influence their work in schools; accurately identify, diagnose, and develop the right solutions to the right problems in order to achieve instructional goals of the school and division; and confront, engage in, and effectively deal with conflict (i.e., politics) emanating from within the school, division, or community in order to achieve school and division learning goals. Prerequisite: ELS 700 or ELS 800.

ELS 806. The Urban System. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of the graduate program director. Introduces students to the discipline of urban studies by focusing on various aspects of the city and cultural diversity. Provides an interdisciplinary overview of economic development and redevelopment, environmental factors, educational systems, health care systems, and government systems. Examines the extent to which urban systems impact diverse residents' lives.

ELS 810. Strategic Communication and External Relations. 3 Credits.
This course serves as an introduction for prospective administrators to the social and political context of the educational environment. The underlying concept of this course is collaboration. Today's administrators face a variety of multifaceted challenges in their daily routines. Therefore, they must recognize the impact of political, socioeconomic situations, community diversity, equity issues, and school community relations on their leadership practices. Prerequisite: ELS 700 or ELS 800.

ELS 811. Leadership Theory for Educational Improvement. 3 Credits.
Lecture 3 hours; 3 credits. This course provides the necessary knowledge to become an integral part of the educational improvement process at the school, division, and state levels. Students will analyze and relate the significant educational trends of the past 20 years to the political process, analyzing the impact on school planning. Students will take an active and vocal role in the discourse and debate about educational policy and practice. Emphasis will be placed on analyzing the context and implementing planning systems to develop mission, goals and programs that result in educational improvement.

ELS 815. Leadership for Equity and Inclusive Education. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on the theories and practices that help educational leaders ensure that students with special needs receive an equitable and inclusive education. Emphasis is on perspectives of difference versus deviance, historical foundations of specialized programs, current social and legal contexts that influence programming, questions of social justice, and possibilities for the inclusion of all students. While this course addresses the needs of all students, concentration is on individuals with disabilities and the laws that safeguard their rights.

ELS 821. Policy and Politics in Educational Leadership. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ELS 811. This course focuses on the theories and practices needed to build relationships and support from the state political process, the local community, businesses, and media. Emphasis will be placed on the use of influence, and its impact on relationships, policies, and programs. Focus is placed on developing a shared vision to bring schools and communities together as partners in improving student learning. Two-way communication mechanisms for school improvement using political influence and power are examined.

ELS 827. Learning Theories and Professional Development. 3 Credits.
This course exposes students to the essential elements of instructional leadership. Central to the skills and knowledge necessary to be an effective instructional leader are a deep understanding of the learning sciences that inform us about the essence of effective teaching. Effective instructional leaders have a solid basis for assessing and promoting high quality instruction, giving them the tools to proactively build a school's organizational capacity of sustained growth in student achievement. Students will engage in reading, reflection, dialog, writing, problem solving and field-work, designed to build an understanding of how these topics are intrinsically tied to supporting teachers in their classrooms through facilitating better understandings of standards and accountability, effective lesson planning and curriculum development, assessment and grading, classroom management and discipline. Prerequisite: ELS 700 or ELS 800.

ELS 828. Instructional Leadership and Supervision. 3 Credits.
This course develops student's skills, knowledge and dispositions in the area of instructional leadership. Students will explore how effective instructional leaders can use their integrated knowledge of quality instruction and the core principles of learning to set the mission and vision for the school, facilitate school improvement planning and professional development and finally how instructional supervision is used to integrate these activities and support the growth of individual teachers as well as building organizational capacity. Effective instructional leaders have a solid basis for assessing and promoting high quality instruction, giving them the tools to proactively build a school's organizational capacity for sustained growth in student achievement. Students will engage in reading, reflection, dialog, writing, problem solving and field-work, designed to help them build an integrated understanding of those leadership practices that help support teacher instructional growth and those that build organizational capacity for sustained improvement. Prerequisite: ELS 700 or ELS 800.

ELS 831. Accountability Systems in Public Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: ELS 660, 732 and 880. This course addresses the design, development, implementation, and alignment of public education accountability systems at the federal, state, and local levels. Particular attention is given to how the design and implementation of accountability systems affects educational equity and school reform efforts.

ELS 835. Organizational Theory and Behavior in Education. 3 Credits.
Lecture 3 hours; 3 credits. This course includes the psychology of organizational behaviors, theories of managing people, individual and organizational learning, individual motivation and organizational behavior, interpersonal communications and perceptions, group dynamics, problem management, managing multigroup work, managing diversity, leadership and organizational culture, leadership and decision making, the effective exercise of power and influence, supervision and employee development, organizational analysis, and managing change.

ELS 853. Educational Finance and Budgeting. 3 Credits.
This course examines how public schools are financed, including an analysis of the sources of revenues, the distribution of revenue, and the budgeting and expenditure of revenue. Special emphasis will be placed on the Virginia funding formula, education as an investment in human capital, and how funding relates to student achievement. Students will learn the fiscal management skills and understandings necessary to manage the finances of a school or school system, including the study of system and school procedures related to budget planning, budget management, internal school account management, inventory control, and purchasing procedures. Prerequisite: ELS 700 or ELS 800.

ELS 854. Human Resource Development and Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ELS 600. This course focuses on the development of various staff personnel functions. Collaborative staff development and performance evaluation are linked to organizational goals, culture and learner achievement. Application of knowledge and skills via case study, simulation and oral and written demonstration projects is included.
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ELS 869. Instructional Internship. 3 Credits.
Title credits 20 hrs; 3 credits. Prerequisite: ELS 673. Each internship course will require students to complete a minimum of 160 hours in each course. Course is designed to provide field experiences which will prepare them to serve as instructional and curriculum leadership in K-12 environments. Student must produce 1) a portfolio with required artifacts; 2) prepare a 10-12 reflective paper according to identified guidelines and 3) complete internship evaluation with mentor and college supervisor at least three times during the term.

ELS 871. Educational Systems Planning and Futures. 3 Credits.
Lecture 3 hours; 3 credits. The course covers the theoretical framework of strategic, operational, cooperative and future planning in education, leading to the development of a cyclic planning process which includes the appropriate tasks, steps and skills to effect administrative and policy change.

ELS 873. Advanced School Law. 3 Credits.
Lecture, 3 hours. 3 credits. Advanced Education Law—doctoral level.

ELS 874. Advanced School Finance, and Operations. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisites: ELS 753/853 or equivalent. This course examines social justice issues related to the financial, political, and operational aspects of America’s public schools. The politics of current legislation, court cases, finances, and operations of the school system are included.

ELS 876. Leadership for Social Justice. 3 Credits.
Lecture 3 hours; 3 credits. In this course, students study and engage in dialogue related to the critical role of education in a democratic society in a rapidly changing and increasingly complex world. Through a focused discussion of theories and concepts such as democratic schools, social justice, critical theory and power, feminism, critical race theory, and difference/normalization, students come to understand the possible roles of education in society and their need to continuously reflect on their own vision for leadership in public schools.

ELS 878. Leadership for Teaching and Learning. 3 Credits.
Lecture 3 hours; 3 credits. In this course, participants examine what is currently known and explore what needs to be known about pedagogy in a context of school renewal. The foundational perspective for the course is social justice in which course participants seek ways to transform teaching/instruction so that all schools work for all students particularly those students who historically have been disenfranchised from receiving an equitable education.

ELS 879. Field Research in School Administration and Supervision. 3 Credits.
3 credits. Prerequisite: a master’s degree. Field study approach to problems related to school administration and supervision.

ELS 880. Multicultural Curriculum Leadership and Globalization. 3 Credits.
This course examines social justice issues related to the curriculum leadership aspect of American’s public schools and abroad. This course is designed to provide advanced understanding of the curriculum development process through conception, implementation, and evaluation with a particular focus on multiculturalism. Theoretical and philosophical bases of curriculum development are addressed as well as current trends including brain-based learning, multiculturalism, globalization, organizational thinking and the strategic change process.

ELS 883. Contemporary Issues in Education. 3 Credits.
Lecture 3 hours; 3 credits. This course is a survey of current issues in education, as well as the political, financial, and social issues affecting education leadership. The course will explore relationships between current issues, historical perspectives, philosophical theories, and sociologic influences. The exploration of contemporary issues related to equity and achievement will serve as a critical component of the class.

ELS 885. Topics in Educational Leadership. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

ELS 886. Topics in Urban Educational Leadership. 1-3 Credits.
1-3 credits. Prerequisite: master’s degree and permission of the instructor.

ELS 887. Topics in Educational Leadership. 1-3 Credits.
ELS 889. Dissertation. 1-12 Credits.
1-12 credits. Prerequisite: permission of faculty advisor.

ELS 999. ELS 999. 1 Credit.
1 credit. This is a placeholder course for students who must be registered for a class and who are not registered for dissertation credit.

ENGL - English

ENGLISH Courses

ENGL 503. Medieval Literature. 3 Credits.
An introduction to representative works of English literature(some in translation) from Beowulf through Chaucer’s Canterbury Tales, The Book of Margery Kempe, The Second Shepherd’s Play, and Malory’s Morte d’Arthur. Students will discover how medieval literature has contributed to and continues to complicate modern conceptions of reading, writing, and aesthetics.

ENGL 506. The Teaching of Literature. 3 Credits.
This course is designed to provide an intensive examination of issues, approaches, and methods utilized in the teaching of literature, particularly literature written for children and young adults.

ENGL 507. Chaucer’s Canterbury Tales. 3 Credits.
A study of The Canterbury Tales with an introduction to Middle English language and culture.

ENGL 514. Motherhood: Texts and Images. 3 Credits.
This course examines the role of the mother, the experience of mothering and the institution of motherhood through a number of disciplinary and theoretical lenses. It considers how motherhood functions to women’s advantage or disadvantage in professional and economic areas as well as the mother’s ideological construction in public discourse, imagery, non-fiction, and film.

ENGL 516. English Renaissance Drama. 3 Credits.
An extensive survey of the secular national dramas of Renaissance England that were written and performed by Shakespeare’s contemporaries in London between 1576 and 1642. Students study the literary features, social contexts and ideological underpinning of representative works by Kyd, Marlowe, Jonson, Webster, Ford, and others.
ENGL 518. Jewish Writers, 3 Credits.
This course introduces students to the Jewish literary traditions and the cultural trends shaping these traditions and the Jewish identity. It will examine the impact of such issues as immigration, family, marginality, the Holocaust, assimilation, cultural diversity, feminism, Israel, race and religion. The readings will consist of short stories, poems, essays, novels, and autobiographical writing.

ENGL 521. British Literature 1660-1800. 3 Credits.
British literature from the Restoration of the monarchy after the Civil War and Puritan Commonwealth to the French Revolution, focusing on how cultural changes (legalized female actors, commercialized printing, colonialism, and growing market capitalism) interacted with the flowering of satire and scandalous theatrical comedy, and the emergence of modern literary forms (periodical journalism, “picturesque” poetry, and the novel).

ENGL 523. The Romantic Movement in Britain. 3 Credits.
A study of the literature written in Britain between 1770-1830, focusing on how the literary experiments and innovations of poets like Blake, Wordsworth, Coleridge, Byron, Percy Shelley, Keats, Burns, and Barbauld, and of novelists like Mary Shelley, Radcliffe, and Scott interacted with cultural changes such as the Industrial Revolution, the French Revolution, and the emergence of feminism and working-class radicalism.

ENGL 524. Short Works in Narrative Media. 3 Credits.
This course examines short narrative forms in film, video, literature, and multi-media. Individual works will be considered, both for the specific ways in which they make use of the medium in which they appear and for the qualities they share. Particular emphasis will be placed on the relationship between writing and visualization. Students will engage in both creative and critical exercises, so as to see the process from both sides: creative production and critical analysis.

ENGL 525. World Film Directors in Context. 3 Credits.
This course will explore the works of several directors from a variety of world regions. Films will be considered as part of the body of work by each director, as well as in the context of the regions’ other arts, traditions, popular culture, and historical events. Students will become familiar, therefore, with aesthetic, literary, sociological, anthropological and historical approaches to the analysis of film.

ENGL 527. Writing in the Disciplines. 3 Credits.
This is a discussion/workshop course emphasizing contexts and strategies of text production in and across academic disciplines and professional settings. Students will produce a variety of texts designed to meet the needs of specific audiences. (This is a writing intensive course.).

ENGL 532. Origins and Early Development of the British Novel to 1800. 3 Credits.
A study of early novels and how the novel developed from other traditions such as the epic, romance, criminal biography, and travel narrative.

ENGL 533. Victorian Literature. 3 Credits.
Lecture 3 hours; 3 credits. A study of the chief writers and the cultural and philosophical backgrounds of the Victorian era, touching on the changes from the early to the later part of the period. Works analyzed include fiction, nonfiction prose, and poetry.

ENGL 535. Management Writing. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on writing as a means of making and presenting management decisions. (This is a writing intensive course.).

ENGL 538. The Twentieth-Century British Novel. 3 Credits.
Lecture 3 hours; 3 credits. Examination and analysis of a variety of novels in their editorial and cultural contexts.

ENGL 539. Writing in Digital Spaces. 3 Credits.
Lecture 3 hours; 3 credits. This course offers composition practice in critical contemporary digital environments. Readings and discussions will provide the history of and context for these digital spaces. Students should expect to participate in, develop, and engage in critical discussions about a range of digital spaces, including websites, wikis, blogs, and various interactive media.

ENGL 540. General Linguistics, 3 Credits.
An introduction to linguistic analysis. Emphasis is on the analysis of sound systems (phonetics, phonology) and the structure of words and sentences (morphology and syntax).

ENGL 541. American Travel Literature. 3 Credits.
Lecture 3 hours; 3 credits. This is a survey course that examines the American experience, American identity and American culture through travel “texts” that include prose, poetry, art, and film. The course takes an interdisciplinary American Studies approach, using lenses such as race, gender, and class.

ENGL 542. English Grammar. 3 Credits.
This course is a descriptive study of English grammar as it relates to the contexts in which it is used, with implication for grammar pedagogy and TESOL classrooms.

ENGL 543. Southern and African American English. 3 Credits.
This course focuses on the linguistic diversity of the American South, with emphasis on Southern White and African American varieties of English. It examines variation and change in the phonological, lexical, and syntactic systems, language contact, and dialect discrimination directed towards Southern and African American speakers both inside and out of the South.

ENGL 544. History of the English Language. 3 Credits.
A study of the origins and development of the English language. Primary focus is on sound, word, and grammatical changes.

ENGL 546. Studies in American Drama. 3 Credits.
Lecture 3 hours; 3 credits. With rotating topics, this course will pursue particular themes or periods in American drama and theater. Potential areas of inquiry might include melodrama, the early transatlantic stage, rise of stage realism, age of O’Neill, or the contemporary drama.

ENGL 547. The American Novel to 1920. 3 Credits.
Lecture 3 hours; 3 credits. Examination of the American novel from its origins in the late eighteenth century through World War I. The course will emphasize the novel as a genre, cultural trends during the period, and such relevant literary modes as romanticism, realism, and naturalism.

ENGL 548. The American Novel 1920 to Present. 3 Credits.
Lecture 3 hours; 3 credits. Examination of the American novel from the end of World War I to the present day. The course will emphasize formal issues related to the genre of the novel and relevant literary and cultural trends during the period including modernism and postmodernism.

ENGL 549. Craft of Literary Nonfiction. 3 Credits.
A detailed study of technique in literary nonfiction with an emphasis on the memoir, the essay, reportage, and travel narrative. Especially designed for, but not limited to, creative writing students; supplements the creative writing workshops.

ENGL 550. American English. 3 Credits.
This course explores the geographic, social and stylistic diversity of English spoken in the U.S. It also examines how perceptions of dialect diversity affect access to education and other socioeconomic opportunities.

ENGL 551. Advanced Fiction Workshop. 3 Credits.
This course, an expansion of the principles and techniques learned in ENGL 451, focuses on the writing and criticism of the short story, the novella, and the novel. May be repeated for credit. Prerequisites: ENGL 351 or permission of the instructor, based on writing samples submitted.

ENGL 552. Advanced Poetry Workshop. 3 Credits.
This course, an expansion of the principles and techniques learned in ENGL 452, focuses on the writing and criticism of poetry. May be repeated for credit. Prerequisites: ENGL 352 or permission of the instructor, based on writing samples submitted.

ENGL 552. Advanced Poetry Workshop. 3 Credits.
ENGL 554. Creative Nonfiction, 3 Credits.
A course in the techniques of writing nonfiction imaginatively within a factual context. Emphasis is placed on concern for reader psychology, selection of significant detail, and the development of a style at once lively and lucid. Assignments are made individually with regard to the student’s field of interest—history, biography, science, politics, informal essay, etc. Advice is given on the marketing of promising manuscripts. May be repeated for credit. Prerequisites: ENGL 327W or ENGL 351 or permission of the instructor, based on writing samples submitted.

ENGL 555. The Teaching of Composition, Grades 6-12, 3 Credits.
Lecture 3 hours; 3 credits. A study of the theory and practice of teaching writing. Special attention will be given to the ways effective teachers allow theories and experiences to inform their pedagogical strategies.

ENGL 556. The Craft of Fiction, 3 Credits.
A detailed study of fictional technique in the novel and short story, with emphasis on character development, conflict, point of view, plot, setting, mood, tone, and diction. Especially designed for, but not limited to, creative writing students; supplements the creative writing workshops. Prerequisites: ENGL 300 or permission of the instructor.

ENGL 557. The Craft of Poetry, 3 Credits.
A detailed study of technique in poetry, with emphasis on form, imagery, rhythm, and symbolism. Especially designed for, but not limited to, creative writing students; supplements the creative writing workshops. Prerequisites: ENGL 300 or permission of the instructor.

ENGL 559. New Literatures in English, 3 Credits.
Lecture 3 hours; 3 credits. A study of the diverse “new” literatures in English of the Caribbean and Central America, Africa, India, as well as of Canada and Australia, in their current historical and political contexts.

ENGL 560. The Literature of Fact, 3 Credits.
A detailed study of the literary tradition of creative nonfiction. Prerequisites: Permission of the instructor.

ENGL 561. Poetry of the Early Twentieth Century, 3 Credits.
Lecture 3 hours; 3 credits. Works of major British and American poets from 1900 to 1945 are studied.

ENGL 562. Sacred Texts as Literature, 3 Credits.
Lecture 3 hours; 3 credits. A study of how sacred texts reshape a variety of literary forms (narratives, drama, poetry, biography, history). The course may focus on a particular text or a collection of texts drawn from a variety of faith traditions and/or spiritual experiences.

ENGL 563. Women Writers, 3 Credits.
Lecture 3 hours; 3 credits. This course applies concepts developed through women’s studies scholarship and feminist literary criticism to works by women writers of different races and cultures.

ENGL 565. African-American Literature, 3 Credits.
Lecture 3 hours; 3 credits. An investigation of the ways in which literary movements, historical events, social transitions, and political upheavals have influenced African-American literature.

ENGL 566. Asian American Literature, 3 Credits.
The course introduces students to key texts in Asian American literature, supported by critical studies (and on occasion films) to interrogate the theme of Asian American identities in their multiple forms. The course will examine sociopolitical histories that undercut the literature, and the contributions of Asian American writers to the breadth and scope of American as well as global literatures today. Prerequisites: Permission of the instructor.

ENGL 572. America in Vietnam: The Government and the Media in Conflict, 3 Credits.
An examination of America’s role in Vietnam and how the interaction of the media with political and military leaders shaped the subsequent foreign policy decisions and military conduct.

ENGL 573. Writing with Video, 3 Credits.
This course engages students in a comprehensive exploration of video as a rhetorical narrative medium, with emphasis on the actual production of video work. Writing is also integrated into the production process. From brainstorming to storyboarding and critique, writing is positioned as an integral part of the course.

ENGL 577. Language, Gender and Power, 3 Credits.
This interdisciplinary course explores how language reflects and interacts with society, with particular emphasis on gender and race. Topics include definition, framing, stereotypes, language taboos, and powerful and powerless language.

ENGL 580. Investigative Reporting Techniques, 3 Credits.
This course explores how journalists pursue investigative projects that expose waste, mismanagement, conflicts of interest, dangerous business practices, and otherwise challenge the status quo. With a focus on both high tech and traditional research skills, the course will provide instruction in accessing government records kept by local, state and federal agencies. In pursuing in-depth stories that make a difference, contemporary journalists develop strategies for gathering and analyzing data, use social media in pursuit of stories and present stories for print, broadcast and online platforms.

ENGL 581. Advanced Public Relations, 3 Credits.
Designed to strengthen the skills of the public relations practitioner with emphasis on the creative aspects of problem solving. Attention is given to crisis public relations, interviewing, speech writing, and graphics.

ENGL 582. Sports Journalism, 3 Credits.
This is primarily a sportswriting course in which students are introduced to various types and styles of sports stories that are representative of sports journalism as practiced in newspapers and magazines. The course also explores the role of sports in American society.

ENGL 583. Advanced News Reporting, 3 Credits.
Designed to familiarize students with the fundamentals of beat reporting and its practice in the multi-media environment of “converged” newsrooms. The course emphatically focuses on writing but also provides instruction on how the tools and techniques of multimedia platforms are used to enhance storytelling. Emphasis is also placed on accessing information through web-based resources and government documents.

ENGL 584. Feature Story Writing, 3 Credits.
Course includes discussion and practice of writing a variety of newspaper and magazine feature stories. Students will write and critique stories on people, places, businesses, trends, and issues. Assistance is given in the marketing of manuscripts.

ENGL 585. Editorial and Persuasive Writing, 3 Credits.
A study of the practice and function of editorial writing, commentary, reviews and columns for newspapers and online media. Lectures will focus on the techniques of crafting a persuasive argument, content analyses of Pulitzer Prize-winning editorials and columns, and guest lectures by newspaper editorial writers.

ENGL 586. Media Law and Ethics, 3 Credits.
Lecture 3 hours; 3 credits. Designed to introduce students to components of communication law that may affect the professional writer or broadcaster. Topics include defamation, constitutional constraints, freedom of information, privacy, copyright, and telecommunications law. Ethical issues relating to the mass media will also be examined.

ENGL 592. Modern World Drama, 3 Credits.
A comparative study of selected major dramatic works of the world, featuring texts drawn from a range of cultures from around the globe. The course will begin in the late nineteenth century and continue to the present. Works written in languages other than English will be read in translation.
ENGL 593. Contemporary World Literature. 3 Credits.
Fiction, poetry, and plays written during the last fifty years in nations throughout the world. Most texts will have been written originally in languages other than English. The course will focus on the comparative study of works produced in a variety of cultural contexts, and will explore a range of approaches to defining or circumscribing world literature.

ENGL 595. Topics in English. 1-3 Credits.
1-3 credits each semester. The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, because of their specialized nature, may not be offered regularly. These courses will appear in the course schedule and will be more fully described in information distributed to all academic advisors.

ENGL 596. Topics in English. 1-3 Credits.
The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, because of their specialized nature, may not be offered regularly. These courses will appear in the course schedule and will be more fully described in information distributed to all academic advisors. Prerequisites: Permission of the instructor.

ENGL 600. Introduction to Research and Criticism. 3 Credits.
Lecture 3 hours; 3 credits. Required of most graduate students in English, usually in the first semester. Survey of English as an academic discipline; issues and trends in scholarly journals; research strategies and conventions for graduate-level papers and master’s theses; critical approaches to literature.

ENGL 615. Shakespeare. 3 Credits.
Lecture 3 hours; 3 credits. An application of advanced theoretical and critical approaches to Shakespeare's works. May be repeated more than once for credit if different groups of works or themes is being studied.

ENGL 632. 18th Century British Literature. 3 Credits.
Lecture 3 hours; 3 credits. A study of the literature written in the British Isles from the "Glorious Revolution" of 1688 until 1800, focusing on how the flowering of satire and the emergence of literary forms such as periodical journalism, "picturesque" poetry, and the novel interacted with the growth of distinctly modern institutions and philosophies such as a free, commercial press, market capitalism, colonialism, political radicalism, and industrialism.

ENGL 641. 19th Century British Literature. 3 Credits.
Lecture 3 hours; 3 credits. A study of a selection of the literature written in Britain during the romantic and Victorian ages, focusing on the social, historical, and ideological contexts informing its production. Texts analyzed include poetry, fiction, and nonfiction.

ENGL 642. Nineteenth-Century British Novel. 3 Credits.
Lecture 3 hours; 3 credits. A study of 19th Century British novels in context of the economic, social, and political issues of the period, emphasizing their formal and aesthetic concerns.

ENGL 645. 20th Century British Literature. 3 Credits.
Lecture 3 hours; 3 credits. Studies of major poets, dramatists and prose writers. Some attention will be given to the movements, trends, forces, and ideas of the period.

ENGL 650. Creative Writing. 3 Credits.
Guided study and practice in writing short stories, novels, poetry, and creative nonfiction, offered in specific sections of Fiction, Poetry, and Nonfiction. This course can be repeated for credit. Students planning to write a creative thesis must take this course at least twice with their thesis director. Prerequisites: Admission to the MFA program and permission of the instructor.

ENGL 655. Topics in World Literature. 3 Credits.
Lecture 3 hours; 3 credits. Examination of a theme, genre, or other literary topic as it appears in the literature of several countries. All works are assigned in English translation if not originally written in English. Specific topics are listed in the schedule booklet, and course descriptions appear in a booklet distributed to all academic advisors.

ENGL 656. American Literature to 1810. 3 Credits.
Lecture 3 hours; 3 credits. Intensive study of a variety of texts from several genres reflecting the historical forces, aesthetic movements, social trends, and representative works of the period.

ENGL 657. American Literature 1810-1870. 3 Credits.
Lecture 3 hours; 3 credits. Intensive study of a variety of texts from several genres reflecting the historical forces, aesthetic movements, social trends, and representative works of the period.

ENGL 658. American Literature 1870-1946. 3 Credits.
Lecture 3 hours; 3 credits. Intensive study of a variety of texts from several genres reflecting the historical forces, aesthetic movements, social trends, and representative works of the period.

ENGL 659. American Literature 1945-Present. 3 Credits.
Lecture 3 hours; 3 credits. Intensive study of a variety of texts from several genres reflecting the historical forces, aesthetic movements, social trends, and representative works of the period.

ENGL 660. Craft of Narrative. 3 Credits.
A detailed study of the techniques of fiction and nonfiction with some emphasis given to the various theories informing the genres. Prerequisites: Graduate standing and permission of instructor.

ENGL 661. Craft of Poetry. 3 Credits.
A detailed study of the techniques of poetry with some emphasis on the various theories informing the genre. Prerequisites: Graduate standing and permission of instructor.

ENGL 662. Cybercultures and Digital Writing. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: three units of digital writing or instructor’s permission. In this course, students will explore the social, theoretical, and cultural implications of composing with the ever-evolving digital writing technologies. They will also consider how to study the practices the writers use to compose with these technologies.

ENGL 664. Teaching College Composition. 3 Credits.
Lecture 3 hours; 3 credits. An intensive examination of alternative approaches to teaching first-year and advanced composition at the college level, with special attention to current schools of composition theory and research.

ENGL 665. Teaching Writing with Technology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ENGL 539 and either ENGL 555 or ENGL 664. Students in this course will explore different writing environments and educational applications and learn how they are designed to help writers compose, collaborate, research, and think. Students will assess the values and theoretical assumptions underlying those applications and learn to articulate their own philosophies of using technologies in the writing classroom.

ENGL 668. Graduate Internship and Project in Professional Writing. 1-3 Credits.
3 credits. Prerequisites: 15 graduate credits in English. Structured work experience involving extensive writing and editing in a professional setting. The result of the internship is an analytic paper and a portfolio of written work.

ENGL 670. Methods and Materials in TESOL. 3 Credits.
A practical introduction to methods, materials, and course organization in TESOL (Teaching English to Speakers of Other Languages). The course includes language assessment and teaching language in its cultural context as well as technology-enhanced language teaching.

ENGL 671. Phonology. 3 Credits.
An examination of the sound systems of natural languages, with emphasis on English and how it differs from other languages. The course includes articulatory and acoustic phonetics with analyses of data and exercises in transcription, as well as introduction to different phonological theories and their assumptions and notations. Prerequisites: ENGL 540 or permission of the instructor.
ENGL 672. Syntax. 3 Credits.
A detailed examination of morphosyntactic structures found in the world’s languages with an emphasis on English grammar. Prerequisites: ENGL 540 or permission of the instructor.

ENGL 673. Discourse Analysis. 3 Credits.
A survey of approaches to the analysis of spoken discourse. Readings and assignments emphasize issues related to transcription methods, conversational discourse, narrative, social interaction, the influence of prior discourses on texts, and relationships between discourse and power. Prerequisites: ENGL 540 or permission of the instructor.

ENGL 674. Internship in Applied Linguistics. 3 Credits.
A structured work experience involving teaching or work in applied linguistics in a professional setting. To be documented by a portfolio of written work. Prerequisites: 12 graduate credits in linguistics.

ENGL 675. Practicum in TESOL. 3 Credits.
Supervised practice in teaching English to speakers of other languages. Available to those enrolled in the M.A. in Applied Linguistics or TESOL Certificate who have completed core courses. Prerequisites: ENGL 670 and permission of the instructor.

ENGL 676. Semantics. 3 Credits.
This class is an advanced survey of semantic theories and practices. Topics include terminology and taxonomies used in the study of meaning; relationships between linguistic meaning, culture, and cognition (e.g. reference, linguistic relativity, categorization); word meaning; and ways in which contexts of language use influence interpretation. Prerequisites: ENGL 540 or permission of the instructor.

ENGL 677. Language and Communication Across Cultures. 3 Credits.
An investigation of how language and cultural differences affect communication. Readings from linguistics, anthropology, and literature address problems of intercultural communication.

ENGL 678. Sociolinguistics. 3 Credits.
Sociolinguistics is the study of language in its social context with emphasis on ethnography and other qualitative methods, quantitative methods, and linguistic and social differentiation between individuals and groups. Prerequisites: Any upper-division linguistics course or permission of instructor.

ENGL 679. First and Second Language Acquisition. 3 Credits.
An investigation of first and second language acquisition with emphasis on examining evidence about second language learning which supports or fails to support different approaches to teaching a second language.

ENGL 680. Second Language Writing Pedagogy. 3 Credits.
Students engage in many of the theoretical debates about teaching L2 writers, as well as practical responses to these debates. With this knowledge students are prepared to enter the debate, teach L2 writers, and conduct research on L2 writers and writing.

ENGL 681. Contemporary Classics: The Thesis Reading List. 3 Credits.
This course offers students enrolled in the MFA in Creative Writing program the opportunity for rigorous study of contemporary master works in a particular genre. Designed to provide students with the opportunity to deeply investigate contemporary works for the required thesis reading list, this course counts as one of the literature requirements for the MFA degree. The course is best suited for students in the second year of the program; however, any MFA student may register. The course cannot be repeated for credit. Prerequisites: Graduate standing and permission of instructor.

ENGL 683. Literary Editing and Publishing. 3 Credits.
This course is for MFA Creative Writing students, and is meant to provide basic concepts of literary editing and publishing, theoretical and practical frameworks, and hands-on/internship types of experiences managing/reading/editing for the MFA program’s literary journal, Barely South Review. This course can count once toward elective credit in the MFA curriculum and may not be repeated for credit. Prerequisites: Students must be in good graduate standing and must have earned at least 9 credit hours in the MFA program. Pre- or corequisite: This course is a co-requisite for actual internship work in the journal, though students who take this course are NOT automatically guaranteed a staff position in the journal.

ENGL 685. Writing Research. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: 6 graduate credits in English. This course explores current methods and methodologies in writing research. Students will design and carry out original studies of academic, professional, or personal writing as it is practiced in classrooms, work places, and other settings.

ENGL 686. Introduction to Rhetoric and Writing Studies. 3 Credits.
Lecture 3 hours; 3 credits. This course presents key concepts, principles, traditions, and conversations that define the field of rhetoric and composition, surveying major texts, movements, issues, and methodologies. This course is designed primarily to prepare students for advanced courses in professional writing; however, it will also benefit any student who is interested in gaining insights about language, knowledge, and power from the perspective of rhetoric.

ENGL 687. Colloquium for Teachers of English. 3 Credits.
This course discusses theories of teaching, writing and literature and helps explore the challenges facing 21st century educators in terms of finding ways to reach the 21st century student. The course investigates ways to help students understand the inherent value of reading and writing. Additionally, the course looks at pedagogical models and examines how they can be applied to individual areas of expertise. May be repeated for credit when topic varies.

ENGL 694. Thesis Colloquium. 3 Credits.
All MFA students are required to take ENGL 694 before their final semester. The course brings together all genres in a collaborative focus in which students discuss specific thesis projects, format requirements, publishing opportunities and reading lists for the 10-page prefatory essay required for their defense. Prerequisites: May be taken after 24 graduate hours have been completed.

ENGL 695. Topics. 1-3 Credits.
3 credits. The advanced study of a selected topic in English. Topics courses will appear in the course schedule and will be more fully described in information distributed to all academic advisors.

ENGL 696. Independent Readings. 3 Credits.
3 credits. Designed for the advanced student (15-20 hours) who wants to study in-depth a sharply focused area of literature, linguistics, or pedagogy. Before registering for the course, the student must make out a prospectus with the instructor and submit it. No graduate student is permitted to take more than two independent readings courses.

ENGL 698. Thesis Research. 1-9 Credits.
Lecture 1-9 hours; 1-9 credits. Instructor approval required. Prerequisite: Student must have completed 30 hours of course work first. Preparatory course designed to assist students in the writing of a thesis. Students will consult regularly with the faculty.

ENGL 699. Thesis. 3-9 Credits.
Lecture 1-9 hours; 1-9 credits. Instructor approval required. Prerequisite: Student must have completed 30 hours of course work first. Writing of the creative thesis.

ENGL 701. Texts and Technologies. 3 Credits.
Lecture 3 hours; 3 credits. Tracing the development of writing technologies from Ancient Greece through contemporary blogs and wikis, this course focuses on the relationships between a text’s physical qualities and its composition, production, and reception.
ENGL 705. Discourse and Rhetoric Across Cultures. 3 Credits.
Prerequisites: Admission into the Applied Linguistics M.A. or the Ph.D. in English. The course is a survey of language use both within and across cultures. Topics include relationships between language and conceptualization (linguistic relativity); description and interpretation of linguistic and rhetorical patterns; the organization, expression, and analysis of cultural meaning (e.g. frames, cultural models, narratives); relational aspects of language use; and literacy practices.

ENGL 706. Visual Rhetoric and Document Design. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on how visual elements, whether verbal or graphic, work within different types of documents. Theory and research in visual rhetoric and technical communication will be used to develop models for how people process visual information in terms of a variety of social and cultural contexts.

ENGL 710. Major Debates in English Studies. 3 Credits.
Lecture 3 hours; 3 credits. This course introduces students to the principal questions and concerns of the field and includes a comparison and contrast of the subspecialties in English, including how they form and address key issues.

ENGL 715. Professional Writing Theories and Practices. 3 Credits.
Lecture 3 hours; 3 credits. This course surveys the history of professional writing, competing theories and research methodologies in the field. The tensions between workplace practices, professional writing scholarship, and professional writing pedagogy will also be explored.

ENGL 716. International Professional Writing. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ENGL 715. This course focuses on the linguistic and cultural factors that business writers and technical writers must consider when working with/or global audiences. Students will learn to approach cross-cultural communication as a process that starts with researching the target audience.

ENGL 720. Pedagogy and Instructional Design. 3 Credits.
Lecture 3 hours; 3 credits. Students in this course will be prepared to develop pedagogical plans, teach and assess writing in four instructional areas: advanced and professional writing courses, writing across the curriculum, workplace instruction, and distributed learning. New pedagogical tools, especially computer-based technologies, will be taught, analyzed and tested.

ENGL 721. Compositions as Applied Rhetoric. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ENGL 720. This course focuses on the field of rhetoric and composition pedagogy in the United States from its inception at Harvard to postmodern possibilities of today's writing classroom.

ENGL 724. Online Writing Instructions. 3 Credits.
Students will learn how to negotiate the intersection between online instruction and writing pedagogy by exploring and interrogating the ways that various means of course mediation shapes the literacy pedagogy an instructor can develop. ENGL 664 is recommended as a prerequisite.

ENGL 725. Scholarly Editing and Textual Scholarship. 3 Credits.
Lecture 3 hours; 3 credits. Instructor approval required. Surveys the theory and practice of scholarly editing, of the physical description of texts as material artifacts, and of the historical and social contextualization of texts as material artifacts. Focus is on texts produced in manuscripts and print, but consideration is given to oral texts and digital texts.

ENGL 730. The Digital Humanities. 3 Credits.
Lecture 3 hours, 3 credits. Taking historical, cultural, and theoretical views, this course bridges literary studies with new media. How has technology historically affected literature and culture? Can the democratization of information accelerate literary development? Topics will include digital archives, intellectual property in the information age, and electronic textuality.

ENGL 735. Postcolonial Literature and Theory. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Any equivalent graduate level critical theory course or instructor permission. An examination of the discourse of postcolonial critical theory literature produced in postcolonial, diasporic and global contexts.

ENGL 740. Empirical Research Methods and Project Design. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on the theory and design of empirical research conducted in academic and nonacademic settings. Students will examine the methodological complexities of ethnography, meta-analysis, feminist research and other approaches.

ENGL 750. Service Learning in English Studies. 3 Credits.
Lecture 3 hours; 3 credits. Instructor approval required. Students will engage in service-learning activities and apply various concepts and skills from their experience and coursework to identify and respond to the needs in the community. An analytical paper and portfolio of service-learning materials are required.

ENGL 755. Critical Race Theory. 3 Credits.
Lecture 3 hours; 3 credits. The goal of this course is to examine various approaches to Critical Race Studies and, in light of its theoretical commitments, explore its problems, possibilities, and limitations. How might we better understand our history and contemporary politics through the methodologies of critical race theory? Does critical race theory open up new areas for exploration or does it make our understanding of race and ethnicity more indefinite? Such an exploration will require us to think carefully about race and racism, but also other forms of identity like gender, class, and sexuality.

ENGL 760. Classical Rhetoric and Theory Building. 3 Credits.
Lecture 3 hours; 3 credits. Analysis and discussion of classical theories of rhetoric, with attention to how rhetoric describes discourse in the public sphere.

ENGL 763. Seminar in Discourse Analysis. 3 Credits.
Prerequisites: ENGL 540 or permission of the instructor. This course focuses on relationships among language users, text, grammar, context, and purpose within a discourse perspective. Readings and assignments emphasize theoretical and methodological issues related to interactive discourse, registers and genres, narrative and identity, and language, ideology and power.

ENGL 764. Theories of Literature. 3 Credits.
Lecture 3 hours; 3 credits. An in-depth study of selected theories about the form, history, and cultural significance of literature, such as narrative theory, poststructuralism, Marxism, and feminism. Specific topics may vary by semester, but all sections will engage comprehensively with a body of theoretical texts and concerns.

ENGL 765. Modern Rhetoric and Theory Building. 3 Credits.
Lecture 3 hours; 3 credits. This course concerns the development of rhetoric as an academic discipline in the twentieth century, in particular how rhetoric has distinguished itself from literary, historical, philosophical, and linguistic modes of inquiry.

ENGL 766. New Media Theory and Practice I. 3 Credits.
Lecture 3 hours; 3 credits. This course involves hands-on instruction in a variety of software packages used to create websites and multi-media projects. Students will explore the rhetorical, literary, and technical aspects of their own projects as well as other web-based and multi-media compositions/products.

ENGL 770. Research Methods in Applied Linguistics. 3 Credits.
Prerequisites: Permission of the instructor. This course introduces basic concepts, methods, and techniques used to investigate topics and problems in applied linguistics. Both quantitative and qualitative approaches are presented. Methods include surveys, ethnographies, case studies, and experimental designs. Two major goals are emphasized: to become better readers of research reports and develop research and analytical skills applicable to applied linguistics and related fields.
ENGL 771. New Media Theory and Practice II. 3 Credits.
Lecture 3 hours; 3 hours. Prerequisite: ENGL 766. This course builds on the study of new media textural production and consumption in English Studies begun in New Media Theory and Practice I and gives students the opportunity to engage in more advanced theoretical and production work. This course will focus on the integration of multiple modes and media using a variety of software and hardware.

ENGL 775. Seminar in English Studies Pedagogy and Curriculum Design. 3 Credits.
This course introduces students to literacy theory and challenges them to apply it in specific disciplines within English Studies. ENGL 720 or ENGL 820 is recommended as a prerequisite.

ENGL 778. Seminar in Sociolinguistics. 3 Credits.
This seminar investigates socially meaningful language variation. The focus will be on everyday types of speech that people use to situate themselves in social worlds. Topics include ethnography of communication, language ideologies, social and regional variation, and quantitative analysis.

ENGL 783. Seminar in Professional Writing. 3 Credits.
Lecture 3 hours; 3 hours. Prerequisite: Instructor approval. This course will provide an intensive examination of a specific topic or issue in professional writing and serve as a field course for Professional Writing and New Media.

ENGL 790. Seminar in Textual Studies. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Instructor approval. This course will provide an intensive examination of a specific topic or issue in textual studies and serve as a field course for Rhetoric and Textual Studies.

ENGL 791. Seminar in Literary Studies. 3 Credits.
Intensive seminar in a variable topic within literary or literary/cultural studies.

ENGL 793. Seminar in Rhetoric. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Instructor approval. This course will provide an intensive examination of a specific topic or issue in rhetoric and serve as a field course for Rhetoric and Textual Studies.

ENGL 794. Seminar in New Media. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Instructor approval. This course will provide an intensive examination of a specific topic or issue in new media and serve as a field course for Professional Writing and New Media.

ENGL 795. Topics. 3 Credits.
3 credits. Prerequisite: students must be enrolled in a graduate program to take this course. Variable course material for students in PhD in English degree program.

ENGL 797. Independent Study in English. 3 Credits.
Hours to be arranged; 3 credits. Prerequisite: graduate standing. Provides opportunities for doctoral students to do independent research in areas of their interests.

ENGL 801. Texts and Technologies. 3 Credits.
Lecture 3 hours; 3 credits. Tracing the development of writing technologies from Ancient Greece through contemporary blogs and wikis, this course focuses on the relationships between a text’s physical qualities and its composition, production, and reception.

ENGL 805. Discourse and Rhetoric Across Cultures. 3 Credits.
Prerequisites: Admission into the Applied Linguistics M.A. or the Ph.D. in English. The course is a survey of language use both within and across cultures. Topics include relationships between language and conceptualization (linguistic relativity); description and interpretation of linguistic and rhetorical patterns; the organization, expression, and analysis of cultural meaning (e.g. frames, cultural models, narratives); relational aspects of language use; and literacy practices.

ENGL 806. Visual Rhetoric and Document Design. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on how visual elements, whether verbal or graphic, work within different types of documents. Theory and research in visual rhetoric and technical communication will be used to develop models for how people process visual information in terms of a variety of social and cultural contexts.

ENGL 810. Major Debates in English Studies. 3 Credits.
Lecture 3 hours; 3 credits. This course introduces students to the principal questions and concerns of the field and includes a comparison and contrast of the subspecialties in English, including how they form and address key issues.

ENGL 815. Professional Writing Theories and Practices. 3 Credits.
Lecture 3 hours; 3 credits. This course surveys the history of professional writing, competing theories and research methodologies in the field. The tensions between workplace practices, professional writing scholarship, and professional writing pedagogy will also be explored.

ENGL 816. International Professional Writing. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ENGL 815. This course focuses on the linguistic and cultural factors that business writers and technical writers must consider when working with/for global audiences. Students will learn to approach cross-cultural communication as a process that starts with researching the target audience.

ENGL 820. Pedagogy and Instructional Design. 3 Credits.
Lecture 3 hours; 3 credits. Students in this course will be prepared to develop pedagogical plans, teach and assess writing in four instructional areas: advanced and professional writing courses, writing across the curriculum, workplace instruction, and distributed learning. New pedagogical tools, especially computer-based technologies, will be taught, analyzed and tested.

ENGL 821. Compositions as Applied Rhetoric. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: 3 credits of a graduate level rhetoric or composition course or instructor’s permission. Students will examine how the field of rhetoric has shaped composition pedagogy in the United States from its inception at Harvard to postmodern possibilities of today’s writing classroom.

ENGL 824. Online Writing Instruction. 3 Credits.
Students will learn how to negotiate the intersection between online instruction and writing pedagogy by exploring and interrogating the ways that various means of course mediation shapes the literacy pedagogy an instructor can develop.

ENGL 825. Scholarly Editing and Textual Scholarship. 3 Credits.
Lecture 3 hours; 3 credits. Instructor approval required. Surveys the theory and practice of scholarly editing, of the physical description of texts as material artifacts, and of the historical and social contextualization of texts as material artifacts. Focus is on texts produced in manuscripts and print, but consideration is given to oral texts and digital texts.

ENGL 830. The Digital Humanities. 3 Credits.
Lecture 3 hours, 3 credits. Taking historical, cultural, and theoretical views, this course bridges literary studies with new media. How has technology historically affected literature and culture? Can the democratization of information accelerate literary development? Topics will include digital archives, intellectual property in the information age, and electronic textuality.

ENGL 835. Postcolonial Literature and Theory. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Any equivalent graduate level critical theory course or instructor permission. An examination of the discourse of postcolonial critical theory literature produced in postcolonial, diasporic and global contexts.

ENGL 840. Empirical Research Methods and Project Design. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on the theory and design of empirical research conducted in academic and nonacademic settings. Students will examine the methodological complexities of ethnography, meta-analysis, feminist research and other approaches.

ENGL 850. Service Learning in English Studies. 3 Credits.
Lecture 3 hours; 3 credits. Instructor approval required. Students will engage in service-learning activities and apply various concepts and skills from their experience and coursework to identify and respond to the needs in the community. An analytical paper and portfolio of service-learning materials are required.
ENGL 855. Critical Race Theory. 3 Credits.
Lecture 3 hours; 3 credits. The goal of this course is to examine various approaches to Critical Race Studies and, in light of its theoretical commitments, explore its problems, possibilities, and limitations. How might we better understand our history and contemporary politics through the methodologies of critical race theory? Does critical race theory open up new areas for exploration or does it make our understanding of race and ethnicity more indefinite? Such an exploration will require us to think carefully about race and racism, but also other forms of identity like gender, class, and sexuality.

ENGL 860. Classical Rhetoric and Theory Building. 3 Credits.
Lecture 3 hours; 3 credits. Analysis and discussion of classical theories of rhetoric, with attention to how rhetoric describes discourse in the public sphere.

ENGL 863. Seminar in Discourse Analysis. 3 Credits.
Prerequisites: ENGL 805 or permission of the instructor. This course focuses on relationships among language users, text, grammar, context, and purpose within a discourse perspective. Readings and assignments emphasize theoretical and methodological issues related to interactive discourse, registers and genres, narrative and identity, and language, ideology and power.

ENGL 864. Theories of Literature. 3 Credits.
Lecture 3 hours; 3 credits. An in-depth study of selected theories about the form, history, and cultural significance of literature, such as narrative theory, poststructuralism, Marxism, and feminism. Specific topics may vary by semester, but all sections will engage comprehensively with a body of theoretical texts and concerns.

ENGL 865. Modern Rhetoric and Theory Building. 3 Credits.
Lecture 3 hours; 3 credits. This course concerns the development of rhetoric as an academic discipline in the twentieth century, in particular how rhetoric has distinguished itself from literary, historical, philosophical, and linguistic modes of inquiry.

ENGL 866. New Media Theory and Practice I. 3 Credits.
Lecture 3 hours; 3 credits. This course involves hands-on instruction in a variety of software packages used to create websites and multi-media projects. Students will explore the rhetorical, literary, and technical aspects of their own projects as well as other web-based and multi-media compositions/products.

ENGL 870. Research Methods in Applied Linguistics. 3 Credits.
Prerequisites: Permission of the instructor. This course introduces basic concepts, methods, and techniques used to investigate topics and problems in applied linguistics. Both quantitative and qualitative approaches are presented. Methods include surveys, ethnographies, case studies, and experimental designs. Two major goals are emphasized: to become better readers of research reports and develop research and analytical skills applicable to applied linguistics and related fields.

ENGL 871. New Media Theory and Practice II. 3 Credits.
Lecture 3 hours; 3 hours. Prerequisite: ENGL 866. This course builds on the study of new media textual production and consumption in English Studies begun in New Media Theory and Practice I and gives students the opportunity to engage in more advanced theoretical and production work. This course will focus on the integration of multiple modes and media using a variety of software and hardware.

ENGL 875. Seminar in English Studies Pedagogy and Curriculum Design. 3 Credits.
This course introduces students to literacy theory and challenges them to apply it in specific disciplines within English Studies. ENGL 720 or ENGL 820 is recommended as a prerequisite.

ENGL 878. Seminar in Sociolinguistics. 3 Credits.
This seminar investigates socially meaningful language variation. The focus will be on everyday types of speech that people use to situate themselves in social worlds. Topics include ethnography of communication, language ideologies, social and regional variation, and quantitative analysis.

ENGL 883. Seminar in Professional Writing. 3 Credits.
Lecture 3 hours; 3 hours. Prerequisite: Instructor approval. This course will provide an intensive examination of a specific topic or issue in professional writing and serve as a field course for Professional Writing and New Media.

ENGL 890. Seminar in Textual Studies. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Instructor approval. This course will provide an intensive examination of a specific topic or issue in textual studies and serve as a field course for Rhetoric and Textual Studies.

ENGL 891. Seminar in Literary Studies. 3 Credits.
Intensive seminar in a variable topic within literary or literary/cultural studies. Prerequisites: Student must be enrolled in doctoral program to take this course.

ENGL 892. Dissertation Seminar. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: All core, field, and elective coursework must be completed prior to enrollment. This course is taken prior to doctoral candidacy exams. It enables students to develop and refine a topic for the dissertation, do preliminary research, and construct a bibliography under the guidance of a faculty mentor. Students will also use the seminar to prepare bibliographies to be used in candidacy exams.

ENGL 893. Seminar in Rhetoric. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Instructor approval. This course will provide an intensive examination of a specific topic or issue in rhetoric and serve as a field course for Rhetoric and Textual Studies.

ENGL 894. Seminar in New Media. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Instructor approval. This course will provide an intensive examination of a specific topic or issue in new media and serve as a field course for Professional Writing and New Media.

ENGL 895. Topics. 3 Credits.
3 credits. Prerequisite: students must be enrolled in a graduate program to take this course. Variable course material for students in PhD in English degree program.

ENGL 897. Independent Study in English. 1-3 Credits.
Hours to be arranged; 3 credits. Prerequisite: graduate standing. Provides opportunities for doctoral students to do independent research in areas of their interests.

ENGL 898. Directed Research. 1-9 Credits.
1-9 credits. Prerequisite: instructor approval. This course can be taken as a supplement to the Dissertation Seminar for independent investigation in the topic for dissertation.

ENGL 899. Dissertation. 1-9 Credits.
1-9 credits. Prerequisite: 892 Dissertation Seminar and passing Candidacy examination. This course is to be taken only by students who have passed the candidacy exams for the purpose of researching and writing the dissertation.

ENGL 999. English 999. 1 Credit.
1 credit. A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

ENGN - Engineering

ENGINEERING Courses

ENGN 554. Introduction to Bioelectronics. 3 Credits.
Prerequisites: PHYS 111N or higher; MATH 200 or higher. A one semester course covering the electrical properties of cells and tissues as well as the use of electricity and magnetism in the diagnosis and treatment of disease. Typical topics to be covered include electrocardiography, cardiac pacing, defibrillation, electrotherapy, electroproportion, electrotherapy in wound healing. In addition ultrashort electrical pulses for intracellular manipulation and the application of plasmas to biological systems will be covered. (Cross listed with ECE 554).
ENGN 602T. Engineering for Secondary School Teachers. 1-3 Credits.
An introduction to foundations of design and civil, environmental, electrical, mechanical, and computer engineering. The course will consist of secondary school appropriate content and concepts that directly correlate with the state and local school systems’ science and mathematics curriculum. May lead to a Project Lead the Way certification when applicable. Prerequisites: Bachelor’s degree or permission of the instructor.

ENGN 603T. Engineering Seminar for Teachers. 1-3 Credits.
An introductory seminar on specific multi-disciplinary or interdisciplinary engineering topics for MS or HS teachers. Prerequisites: Bachelor’s degree or permission of the instructor.

ENGN 611. Financial Engineering. 3 Credits.
Financial engineering management, accounting, financial reports and analysis, capital budgeting, investment decisions.

ENGN 612. Analysis of Organizational Systems. 3 Credits.
Introduction to fundamental concepts in the analysis of organizations. Examination of social, structural, procedural, and environmental aspects by systems approach. Modules include: History and systems of organizations and management; Basic organizational systems and models; Organizational behavior models; Integration of systems perspectives; and Organizational structures.

ENGN 622. Remote Sensing. 3 Credits.
The course will cover electromagnetic passive and active sensing systems, earth resource satellite systems, digital image formats, image enhancement, interpretations and applications of computer assisted interpretation in mapping, geology, water quality and urban and regional planning. It also covers image rectification, registration and image data merger with GIS.

ENGN 630. Advanced Bioelectrics. 3 Credits.
A one-semester course covering advanced topics in bioelectrics. The course will cover advanced application of pulsed power and plasma in the medical, biological and environmental fields. (Cross-listed with ECE 630). Prerequisites: bachelor’s degree in physics, engineering or biology.

ENGN 671. Carbon-Free Clean Energy. 3 Credits.
Nuclear power and nuclear energy; solar energy; wind energy; geothermal energy; hydroelectric power; hydrogen as energy resource; hydrogen fuel cells; hybrid technologies; global economics and environmental impacts of carbon-free energy.

ENGN 672. Energy Systems Management. 3 Credits.
System management principles; energy systems safety and security; automation and control; environmental effects and comparative risk assessment; energy storage; carbon sequestration; energy systems scale up issues; energy systems integration; hybrid systems; energy systems optimization; effects of public policies on energy systems management.

ENGN 673. Fossil Energy. 3 Credits.
Fossil fuel; global supply and demand; techniques for fossil fuel recovery; technologies for fossil fuel conversion; crude oil characterization and classification, oil refineries, heavy oil shale, tar sand, bitumen; coal characterization, recovery, conversion; natural gas, shale gas, landfill gas, gas hydrates; organic and polymeric wastes; environmental impacts.

ENGN 695. Multidisciplinary Topics in Engineering. 1-3 Credits.
Special interdisciplinary or multidisciplinary topics of interest with emphasis on emerging areas in engineering.

ENGN 697. Independent Study in Energy Engineering. 3 Credits.
Individual analytical, experimental, computational and/or design study selected by the student and supervised by the course instructor.

ENGN 811. Methodologies for Advanced Engineering Projects. 3 Credits.
Critical evaluation of published literature; experimental design and analysis; optimization methods; pre-project planning; definition of scope, projects risks, technical, economical, social, and political constraints; execution strategies; effective proposal development.

ENGN 812. Engineering Leadership. 3 Credits.
Effective communication techniques, strategic planning, building collaborative relationships, conflict management, building high-performance teams, risk management, managing innovations.

ENGN 813. Engineering Ethics. 3 Credits.
Scope of engineering ethics, moral reasoning and ethical theories, the engineer’s responsibility for safety, responsibilities to the employer, responsibilities to the public, rights of engineers, global issues, professional codes of ethics, case studies.

ENMA - Engineering Management

ENGINEERING MANAGEMENT Courses

ENMA 515. Introduction to Systems Engineering. 3 Credits.
Introduces the principles, concepts and process of systems engineering. Examination of problem formulation, analysis, and interpretation as they apply to the study of complex systems. Emphasizes the design nature of systems engineering problem solving, and includes case studies stressing realistic problems. Development of system requirements, system objectives, and the evaluation of system alternatives.

ENMA 520. Statistical Concepts in Engineering Management. 3 Credits.
Introduction to concepts and tools in probability and statistics with applications to engineering design, systems analysis, manufacturing, and quality management problems.

ENMA 600. Cost Estimating and Financial Analysis. 3 Credits.
Introduction to the monetary aspects of engineering projects, including accounting principles; financial reports and analysis; capital budgeting; cost estimation and control; inventory management; depreciation; investment decisions. Knowledge of probability and statistics (ENMA 520 or equivalent) is assumed. Case studies and a term project are required. Pre- or corequisite: ENMA 420/ENMA 520 or equivalent.

ENMA 601. Analysis of Organizational Systems. 3 Credits.
This course introduces the student to fundamental concepts in the analysis of organizations. A systems approach is taken in the examination of social, structural, procedural and environmental aspects that are of consequence to technical professionals and managers. Modules covered include: History and Systems of Organizations and Management; Basic Organizational Systems and Models emphasizing rational, natural and open systems; Organizational Behavior Models; Organizational Structure Models; Integration of Systems Perspectives.

ENMA 602. Systems Engineering Management. 3 Credits.
Students develop a comprehensive set of techniques and methods to design, maintain and evolve the systems engineering function in support of strategic enterprise objectives and operations.

ENMA 603. Operations Research. 3 Credits.
Deterministic and stochastic models for decision making. Topics include: optimization methods; linear and other programming models; network analysis; inventory analysis; queuing theory. Knowledge of probability and statistics (ENMA 520 or equivalent) is assumed.

ENMA 604. Project Management. 3 Credits.
Exploration of the systems approach to planning, scheduling, control, design, evaluation, and leadership of projects in technology-based organizations. The fundamental tools and techniques of project management; role of the project manager; project management systems; project selection; project life cycle; project monitoring and control; project management evaluation and auditing; project risk and failure analysis; contextual nature of project management; project knowledge.

ENMA 605. Program Capstone. 1 Credit.
Comprehensive demonstration of the ME or MEM candidate’s competence in the fields covered by the program of study. Written submission is required, intended to fulfill the non-thesis Master’s Examination requirement. Prerequisites: Completion of minimum of the 18 core credit hours in program of study.
ENMA 606. Engineering Law. 3 Credits.
Basic legal concepts and procedures for understanding the implications of engineering management decisions. Major emphasis on contracts and liability.

ENMA 607. Stochastic Decision Methods. 3 Credits.
Introduction to decision analysis and stochastic models; risk and uncertainty in decision making; probabilistic inventory problems; queuing theory; Markov processes; dynamic programming; Monte Carlo simulation of dynamic systems. Knowledge of probability and statistics (ENMA 520 or equivalent) is assumed.

ENMA 613. Logistics and Supply Chain Management. 3 Credits.
Lecture 3 hours; 3 credits. Studying how logistical decisions impact the performance of the firm and the entire supply chain. Topics include strategic planning, facilities location and analysis, distribution and transportation networks, forecasting, inventory management, and information systems for supply chains. Knowledge of probability and statistics (ENMA 520 or equivalent) is assumed. The course includes case studies and/or a project. Prerequisites: ENMA 603; ENMA 420/ENMA 520 or equivalent.

ENMA 614. Quality Systems Design. 3 Credits.
Integrated analysis of the process quality assurance and improvement function. Quality Deming’s way. Scientific sampling and control charting for quality assurance and control; the quality cost concept and economic aspects of quality decisions. Organization of the quality function for process quality improvement. Knowledge of probability and statistics (ENMA 520 or equivalent) is assumed. Prerequisites: ENMA 420/ENMA 520 or equivalent.

ENMA 616. The Entrepreneurial Engineering Manager. 3 Credits.
Globalization has increased competition among the planet’s enterprises. The quality of products and services has dramatically improved while prices have plummeted. Consumer expectations have risen to very high levels. This phenomenon has accelerated the need for large technical enterprises to become more agile, flexible and responsive to consumer demands. Government agencies are now exempt form this trend: U.S. Government agencies are now required to establish strategic plans for their enterprises and to develop business plans that illustrate the future directions of the enterprise and to define the resources required to realize the vision and strategy of the enterprise. This course introduces Engineering Management students to a wide range of approaches designed to facilitate start-up, enable growth and ensure the continued capability of emerging and mature technical enterprises.

ENMA 640. Integrated Systems Engineering I. 3 Credits.
This course examines the role and nature of systems engineering. It is specifically designed to provide the fundamental understanding of systems engineering and complex systems. This course examines a variety of systems engineering topics with emphasis on the: (1) development of the fundamentals of systems engineering, (2) systems engineering life-cycle models and phases, (3) systems design for operational feasibility, and (4) an introduction to planning for systems engineering and management. This course prepares students to assume the role of a systems engineer in planning, directing, conducting, and assessing systems engineering initiatives.

ENMA 641. Requirements Management, Verification and Validation. 3 Credits.
Comprehensive treatment of the nature and utility of requirements, verification, and validation in systems engineering processes. Topics include: establishing user requirements; traceability; baseline and evolving requirements; governing standards; requirements management; issues in requirements for complex systems; role and methods for verification and validation in systems engineering; data treatment and analysis; standards, practices, and issues for verification and validation in systems engineering.

ENMA 660. Systems Architecture and Modeling. 3 Credits.
Students learn the essential aspects of the systems architecture paradigm through development and analysis of multiple architecture frameworks and enterprise engineering. Emphasis is placed on systems modeling and enterprise engineering.

ENMA 667. Cooperative Education. 1-3 Credits.
Available for pass/fail grading only. Student participation for credit based on academic relevance of the work experience, criteria, and evaluative procedures as formally determined by the department and the Cooperative Education program prior to the semester in which the work experience is to take place.

ENMA 668. Internship. 1-3 Credits.
Academic requirements will be established by the graduate program director and will vary with the amount of credit desired. Allows students an opportunity to gain short-duration career-related experience. Meant to be used for one-time experience. Work may or may not be paid. Project is completed during the term.

ENMA 669. Practicum. 1-3 Credits.
Academic requirements will be established by the department and will vary with the amount of credit desired. Allows students an opportunity to gain short duration career related experience. Student is usually already employed - this is an additional project in the organization. Prerequisites: Approval by department and Career Management.

ENMA 670. Cyber Systems Engineering. 3 Credits.
This course provides an overview of functioning of cyber systems including how a computer interacts with the outside world. The composition of critical infrastructure and functioning of different engineered systems that form critical infrastructure are discussed. Mutual dependence and interactions between cyber systems and other engineered and the resulting security risks are also explored. Prerequisites: Undergraduate students in STEM fields or graduate students of STEM degree or instructor’s approval.

ENMA 673. Threat Modeling and Risk Analysis. 3 Credits.
This course discusses how to develop cyber threat models using attack graphs/trees, STRIDE, Universal Modeling Language (UML), attack graphs/trees and common of risk analysis tools. Course also discusses the need for quantitative security analysis and formal validation of security models and basic principles of formal model validation. Prerequisites: ENMA 670 or MSIM 670 and MSIM 672; undergraduate students in STEM fields or graduate students of STEM degree or instructor’s approval.

ENMA 690. Preparation Seminar for Systems Engineering Certification. 1 Credit.
A comprehensive treatment and review of systems engineering in preparation for the International Council for Systems Engineering (INCOSE) system engineering certification. Students may elect this course to fulfill their program capstone requirement. Registration for the systems engineering certification examination is required for successful completion of this course. (The certification exam registration fee is not covered as a part of this course.)

ENMA 695. Topics in Engineering Management. 1-3 Credits.
Special topics of interest with emphasis placed on recent developments in engineering management. Prerequisites: Permission of the instructor.

ENMA 696. Topics in Engineering Management. 1-3 Credits.
Special topics of interest with emphasis placed on recent developments in engineering management. Prerequisites: Permission of the instructor.

ENMA 697. Independent Study in Engineering Management. 3 Credits.
Individual study selected by the student. Supervised and approved by a faculty member with the approval of the Graduate Program Director. Prerequisites: Permission of Graduate Program Director.

ENMA 698. Master’s Project. 1-3 Credits.
The master’s project is guided under the supervision of the course instructor. Projects must be approved by the Graduate Program Advisor. Prerequisites: Graduate Program Director permission is required.

ENMA 699. Thesis. 1-6 Credits.
Research leading to a Master of Science thesis. Prerequisites: ENMA 721 and permission of the Graduate Program Director.
ENMA 700. Economic Analysis of Capital Projects. 3 Credits.
This course is targeted at engineering managers who actively participate in the capital budgeting process and project justification. Topics include capital budgeting techniques (including multi-attribute decision making), utility theory, justification of new technologies, and current research in engineering economics. Reading and application of current research in the field is stressed. Case studies are used. Oral presentations and term project required. Prerequisites: ENMA 600.

ENMA 702. Methods for Rational Decision Making. 3 Credits.
The goal of this course is to enhance the student’s ability to make rational and strategic decisions in complex situations. The course is split in two modules: decision theory and game theory. The decision theory module focuses on how individuals make complex decisions, both from a prescriptive (ideal) and descriptive (actual) perspective. The game theory module focuses on strategic decision-making in situations where individuals must interact with one another.

ENMA 703. Optimization Methods. 3 Credits.
Covers advanced methods in Operations Research and Optimization. Focus will be on developing models and their applications in different domains including manufacturing and service. Modern optimization tools will be used to implement models for case studies, projects and research papers. The knowledge of programming and spreadsheets is expected. Contact instructor for more details.

ENMA 704. Design of Project Knowledge Systems. 3 Credits.
Graduate level research colloquium examining the application of a systems perspective to design, operation, analysis, and evaluation of project knowledge systems. Special emphasis will be placed on knowledge generation and generalization systems. Case studies, problems, and a course project.

ENMA 705. Financial Engineering. 3 Credits.
This course covers concepts in complex investments, how to deal with uncertainty in today’s global markets, and how to engineer and manage financial decisions. The main topics include: cash flows, portfolio theory, capital management, securities, hedge funds, optimal investment and financial engineering evaluations among others.

ENMA 710. Modeling and Analysis of Systems. 3 Credits.
Probability and statistics (or an equivalent course). Covers modern modeling paradigms for deterministic and stochastic complex and dynamic systems. This includes, but not limited to, Discrete Simulation, Queuing Systems, and Agent-based models among others. Great focus will be on system analysis using different developed models in different domains such as production, logistics, security, and service, military and social. The course entails up to two exams, multiple case studies, individual and group projects and research papers. Prerequisites: ENMA 420/ENMA 520 or equivalent.

ENMA 711. Methodology for Advanced Engineering Projects. 3 Credits.
The course covers general topics that are necessary for project execution. This includes problem scoping, data collection, hypothesis formulation and testing, experimentation, testing and evaluation, qualitative analysis, quantitative analysis, and validation methods.

ENMA 712. Multi-Criteria Decision Analysis and Decision Support Systems. 3 Credits.
Currently, complex engineering-economic-societal decisions are made by involving numerous sometimes conflicting criteria and attributes, different decision rules and in the presence of various stakeholders with individual preferences who are willing to go into negotiation procedures. A number of multi-criteria decisions tools involving quantitative as well as qualitative methods, together with adequate decision support tools will be introduced. Case studies on a variety of engineering, environmental and security related aspects will also be considered.

ENMA 713. Integrating Ethics and Engineering Management. 3 Credits.
This course is designed to expose prospective engineering managers to the theories and practices that are inherent in the ethical environment of modern organizations. Topics include definitions of ethical behavior and leadership, moral decision-making, the importance of values such as honesty, integrity, and trustworthiness. A full exploration of ethical autonomy, collaboration, communication and moral imagination will be conducted. A variety of methods will be used to facilitate learning, including a textbook, regular journaling, movies and videos, case studies, small work group activities, experiential activities and writing assignments. The successful student should gain a full understanding of the requirements for and the practice of ethical leadership and should be able to determine how to create and maintain a work environment that fosters openness and clear communication about issues and problems.

ENMA 714. Crisis Project Management. 3 Credits.
Graduate-level research colloquium examining the existing and potential role of project management approaches and analysis procedures in the handling of crisis-related activities. Emphasis will be placed on the management of organizational level processes and activities related to crisis preparation, handling and recovery. Case studies, problems and reports.

ENMA 715. Systems Analysis. 3 Credits.
The course is designed to provide an understanding of the interdisciplinary aspects of systems development, operation, and support. The course focuses on the application of scientific and engineering efforts to transform an operational need into a defined system configuration through the interactive process of design, test, and evaluation.

ENMA 716. Complex Adaptive Situations Environment. 3 Credits.
The course focuses on the manner in which information, knowledge, and awareness are processed to facilitate decision making, management and engineering in complex adaptive situations. Topics include: knowledge acquisition, formation of technical and contextual awareness, and the role of understanding.

ENMA 717. Cost Engineering. 3 Credits.
Introduction to parametric cost modeling techniques and methodologies; generation and application of statistical relationships between life cycle costs and measurable attributes of complex systems; sources of supporting data; quality function deployment; technology forecasting. Special emphasis on life cycle design for cost; cost risk analysis; and design optimization on cost bases. Case studies and a semester project.

ENMA 721. Foundations of Research. 3 Credits.
This course is intended to prepare students to undertake substantiated, rigorous, scholarly research, particularly theses or dissertations. The course will focus on the approaches necessary to integrate research intent, techniques and constraints. A variety of research approaches will be investigated. Emphasis on problem formulation, literature review, proposal preparation, oral presentation, experimentation and accepted canons of research. Knowledge of probability and statistics (ENMA 420/ENMA 520 or equivalent) is assumed. Research paper required. Prerequisites: ENMA 420/ENMA 520 or equivalent.

ENMA 723. Enterprise and Complex System Dynamics. 3 Credits.
The use of system dynamics modeling and simulation in various enterprise and complex system application areas. Topics include: complex and hierarchical system dynamics, tools for systems thinking, the dynamics of growth, modeling and simulation tools, and model development, use and analysis.

ENMA 724. Risk Analysis. 3 Credits.
Approaches to the management of risk; probability assessment methods; risk modeling; use of software packages; extensions of decision analysis, including stochastic dominance and multiattribute methods; applications to project management, scheduling, and cost estimation.
ENMA 735. Team Performance and Decision Making in Engineering. 3 Credits.
This course explores and models the use of teams in organizations with a specific focus on the role of teams in decision making and problem solving. Key areas include team building, assessment of team outcomes, team learning, virtual teams and team decision making. Actual work on teams is required including team deliverables.

ENMA 743. Reliability and Maintainability. 3 Credits.
Introduction to the theory and practice of reliability engineering, maintainability and availability. Reliability evaluation models and techniques; failure data collection and analysis; reliability testing and modeling; maintained systems; mechanical system reliability. Semester project. Prerequisites: ENMA 420/ENMA 520 or equivalent.

ENMA 750. System of Systems Engineering. 3 Credits.
Comprehensive treatment of System of Systems Engineering (SoSE), including: fundamental systems principles, concepts, and governing laws; complex and simple systems; underlying paradigms, methodologies and essential methods for SoSE analysis, design, and transformation; complex system transformation; current state of SoSE research and application challenges. Explores the range of technological, human/social, organizational/managerial, policy, and political dimensions of the SoSE problem domain.

ENMA 751. Complexity, Engineering and Management. 3 Credits.
This course examines management and engineering of complex systems as it is undertaken in complex situations. The student will develop an understanding of the unconditional attributes of complex systems and situations that become foundational in the development of robust methods to deal with the practical reality of working in dynamic, uncertain environments. Topics will include Complexity, Complex Systems, Complex Adaptive Systems, Complex Responsive Processes, Complex Adaptive Situations Methodology, SOSE, Reciprocity, and Sociotechnical Systems.

ENMA 752. Agent-Directed Simulation and Systems Engineering. 3 Credits.
The student will learn about methods and tools for agent-directed simulation in support of systems engineering as well as applications of systems engineering for the development of complex agent-directed simulation applications. Students should have knowledge of principles of systems engineering, modeling and simulation, and a higher programming language prior to registering.

ENMA 763. Robust Engineering Design. 3 Credits.
Robust design approach based on "Taguchi Methods.” Off-line quality engineering and applied design-of-experiments methods; full factorial and fractional factorial designs; response surface methods. The course is designed to enable engineers and engineering managers from all disciplines to recognize potential applications, formulate problems, plan experiments, and analyze data. Knowledge of probability and statistics (ENMA 420/ENMA 520 or equivalent) is assumed. Case studies. Semester project. Prerequisites: ENMA 420/ENMA 520 or equivalent.

ENMA 771. Risk and Vulnerability Management of Complex Interdependent Systems. 3 Credits.
Seminar discussions and team projects. A systematic approach to basic principles of design, economics and management of critical infrastructure systems, including issues of risk, vulnerability and risk governance. Development of advanced methodologies, e.g. system of systems, by use of complexity analysis, dynamic/chaotic behavior, threat analysis, resilient design and management under normal and stress conditions. Adopting an agent based modeling approach under conditions of uncertainty, dysfunctionality, malicious attacks and/or presence of natural perils.

ENMA 776. Engineering Principles of Combat Modeling and Distributed Simulation. 3 Credits.
Prerequisites: ENMA 710, MSIM 601, or equivalent. This course introduces students to the engineering principles of model movement, effects, sensors, and command and control of military operations. An overview of standards for distributed simulation enabling global federations is provided as well as challenges of interoperability, composability, and integratability in C2 systems. Technical solutions are addressed.

ENMA 780. Leadership for Engineering Managers. 3 Credits.
Prerequisites: ENMA 601 or Ph.D. status. Seminar discussions and team projects. This course is designed to expose students to the concepts, skills, characteristics and emotional composition of effective and successful leaders in the 21st century. The course is intensive and requires students to immerse themselves in the course material and classroom discussion to derive meaning and value from the topics. The course objectives will be achieved by classroom discussion of the assigned material, candid self-assessment, experimental exercises and analysis of the actions of leaders, as described in case studies and literature. Areas of exploration include the fundamentals of leadership, ethical leadership, social capital, emotional intelligence and three-dimensional leadership.

ENMA 795. Topics in Engineering Management. 1-3 Credits.
Special topics of interest with emphasis placed on recent developments in engineering management.

ENMA 796. Topics in Engineering Management. 3 Credits.
Special topics of interest with emphasis placed on recent developments in engineering management.

ENMA 797. Independent Study in Engineering Management. 1-3 Credits.
Designed for advanced individualized study into an engineering management topic area. Independent study projects will be related to engineering management and completed under the supervision of a certified faculty member. Prerequisites: Permission of the instructor and Graduate Program Director.

ENMA 800. Economic Analysis of Capital Projects. 3 Credits.
It is targeted at engineering managers who actively participate in the capital budgeting process and project justification. Topics include capital budgeting techniques (including multi-attribute decision making), utility theory, justification of new technologies, and current research in engineering economics. Reading and application of current research in the field is stressed. Case studies are used. Oral presentations and term project required. Prerequisites: ENMA 600.

ENMA 802. Methods for Rational Decision Making. 3 Credits.
The goal of this course is to enhance the student’s ability to make rational and strategic decisions in complex situations. The course is split in two modules: decision theory and game theory. The decision theory module focuses on how individuals make complex decisions, both from a prescriptive (ideal) and descriptive (actual) perspective. The game theory module focuses on strategic decision-making in situations where individuals must interact with one another.

ENMA 803. Optimization Methods. 3 Credits.
Covers advanced methods in Operations Research and Optimization. Focus will be on developing models and their applications in different domains including manufacturing and service. Modern optimization tools will be used to implement models for case studies, projects and research papers. The knowledge of programming and spreadsheets is expected. Contact instructor for more details.

ENMA 804. Design of Project Knowledge Systems. 3 Credits.
Graduate level research colloquium examining the application of a systems perspective to design, operation, analysis, and evaluation of project knowledge systems. Special emphasis will be placed on knowledge generation and generalization systems. Case studies, problems, and a course project.

ENMA 805. Financial Engineering. 3 Credits.
This course covers concepts in complex investments, how to deal with uncertainty in today’s global markets, and how to engineer and manage financial decisions. The main topics include: cash flows, portfolio theory, capital management, securities, hedge funds, optimal investment and financial engineering evaluations among others.
ENMA 810. Modeling and Analysis of Systems. 3 Credits.
Covers modern modeling paradigms for deterministic and stochastic complex and dynamic systems. This includes, but not limited to, Discrete Simulation, Queuing Systems, and Agent-based models among others. Great focus will be on system analysis using different developed models in different domains such as production, logistics, security, and service, military and social. The course entails up to two exams, multiple case studies, individual and group projects and research papers. Prerequisites: ENMA 420/ENMA 520 or equivalent.

ENMA 811. Methodology for Advanced Engineering Projects. 3 Credits.
The course covers general topics that are necessary for project execution. This includes problem scoping, data collection, hypothesis formulation and testing, experimentation, testing and evaluation, qualitative analysis, quantitative analysis, and validation methods.

ENMA 812. Multi-Criteria Decision Analysis and Decision Support Systems. 3 Credits.
Currently, complex engineering-economic-societal decisions are made by involving numerous sometimes conflicting criteria and attributes, different decision rules and in the presence of various stakeholders with individual preferences who are willing to go into negotiation procedures. A number of multi-criteria decisions tools involving quantitative as well as qualitative methods, together with adequate decision support tools will be introduced. Case studies on a variety of engineering, environmental and security related aspects will also be considered.

ENMA 813. Integrating Ethics and Engineering Management. 3 Credits.
This course is designed to expose prospective engineering managers to the theories and practices that are inherent in the ethical environment of modern organizations. Topics include definitions of ethical behavior and leadership, moral decision-making, the importance of values such as honesty, integrity, and trustworthiness. A full exploration of ethical autonomy, collaboration, communication and moral imagination will be conducted. A variety of methods will be used to facilitate learning, including a textbook, regular journaling, movies and videos, case studies, small work group activities, experiential activities and writing assignments. The successful student should gain a full understanding of the requirements for and the practice of ethical leadership and should be able to determine how to create and maintain a work environment that fosters openness and clear communication about issues and problems.

ENMA 814. Crisis Project Management. 3 Credits.
Graduate-level research colloquium examining the existing and potential role of project management approaches and analysis procedures in the handling of crisis-related activities. Emphasis will be placed on the management of organizational level processes and activities related to crisis preparation, handling and recovery. Case studies, problems and reports.

ENMA 815. Systems Analysis. 3 Credits.
The course is designed to provide an understanding of the interdisciplinary aspects of systems development, operation, and support. The course focuses on the application of scientific and engineering efforts to transform an operational need into a defined system configuration through the interactive process of design, test, and evaluation.

ENMA 816. Complex Adaptive Situations Environment. 3 Credits.
The course focuses on the manner in which information, knowledge, and awareness are processed to facilitate decision making, management and engineering in complex adaptive situations. Topics include: Knowledge acquisition, formation of technical and contextual awareness, and the role of understanding.

ENMA 817. Cost Engineering. 3 Credits.
Introduction to parametric cost modeling techniques and methodologies; generation and application of statistical relationships between life cycle costs and measurable attributes of complex systems; sources of supporting data; quality function deployment; technology forecasting. Special emphasis on life cycle design for cost; cost risk analysis; and design optimization on cost bases. Case studies and a semester project.

ENMA 821. Foundations of Research. 3 Credits.
This course is intended to prepare students to undertake substantiated, rigorous, scholarly research, particularly theses or dissertations. The course will focus on the approaches necessary to integrate research intent, techniques and constraints. A variety of research approaches will be investigated. Emphasis on problem formulation, literature review, proposal preparation, oral presentation, experimentation and accepted canons of research. Research paper required. Prerequisites: ENMA 420/ENMA 520 or equivalent.

ENMA 823. Enterprise and Complex System Dynamics. 3 Credits.
The use of system dynamics modeling and simulation in various enterprise and complex system application areas. Topics include: complex and hierarchical system dynamics, tools for systems thinking, the dynamics of growth, modeling and simulation tools, and model development, use and analysis.

ENMA 824. Risk Analysis. 3 Credits.
Approaches to the management of risk; probability assessment methods; risk modeling; use of software packages; extensions of decision analysis, including stochastic dominance and multivariate methods; applications to project management, scheduling, and cost estimation.

ENMA 835. Team Performance and Decision Making in Engineering. 3 Credits.
This course explores and models the use of teams in organizations with a specific focus on the role of teams in decision making and problem solving. Key areas include team building, assessment of team outcomes, team learning, virtual teams and team decision making. Actual work on teams is required including team deliverables.

ENMA 843. Reliability and Maintainability. 3 Credits.
Comprehensive treatment of System of Systems Engineering (SoSE), including: fundamental systems principles, concepts, and governing laws; complex and simple systems; underlying paradigms, methodologies and essential methods for SoSE analysis, design, and transformation; complex system transformation; current state of SoSE research and application challenges. Explores the range of technological, human/social, organizational/managerial, policy, and political dimensions of the SoSE problem domain.

ENMA 850. System of Systems Engineering. 3 Credits.
This course examines management and engineering of complex systems as it is undertaken in complex situations. The student will develop an understanding of the unconditional attributes of complex systems and situations that become foundational in the development of robust methods to deal with the practical reality of working in dynamic, uncertain environments. Topics will include Complexity, Complex Systems, Complex Adaptive Systems, Complex Responsive Processes, Complex Adaptive Situations Methodology, SOSE, Reciprocity, and Sociotechnical Systems.

ENMA 852. Agent-Directed Simulation and Systems Engineering. 3 Credits.
The student will learn about methods and tools for agent-directed simulation in support of systems engineering as well as applications of systems engineering for the development of complex agent-directed simulation applications. Students should have knowledge of principles of systems engineering, modeling and simulation, and a higher programming language prior to registering.
ENMA 863. Robust Engineering Design. 3 Credits.
Robust design approach based on “Taguchi Methods.” Off-line quality engineering and applied design-of-experiments methods; full factorial and fractional factorial designs; response surface methods. The course is designed to enable engineers and engineering managers from all disciplines to recognize potential applications, formulate problems, plan experiments, and analyze data. Case studies. Semester project. Prerequisites: ENMA 420/ENMA 520 or equivalent.

ENMA 871. Risk and Vulnerability Management of Complex Interdependent Systems. 3 Credits.
Prerequisites: Permission of the instructor. Seminar discussions and team projects. A systematic approach to basic principles of design, economics and management of critical infrastructure systems, including issues of risk, vulnerability and risk governance. Development of advanced methodologies, e.g. system of systems, by use of complexity analysis, dynamic/chaotic behavior, threat analysis, resilient design and management under normal and stress conditions. Adopting an agent based modeling approach under conditions of uncertainty, dysfunctionality, malicious attacks and/or presence of natural perils.

ENMA 876. Engineering Principles of Combat Modeling and Distributed Simulation. 3 Credits.
Prerequisites: ENMA 710, MSIM 601, or equivalent. This course introduces students to the engineering principles of model movement, effects, sensors, and command and control of military operations. An overview of standards for distributed simulation enabling global federations is provided as well as challenges of interoperability, composability, and integratability in C2 systems. Technical solutions are addressed.

ENMA 880. Leadership for Engineering Managers. 3 Credits.
Seminar discussions and team projects. This course is designed to expose students to the concepts, skills, characteristics and emotional composition of effective and successful leaders in the 21st century. The course is intensive and requires students to immerse themselves in the course material and classroom discussion to derive meaning and value from the topics. The course objectives will be achieved by classroom discussion of the assigned material, candid self-assessment, experimental exercises and analysis of the actions of leaders, as described in case studies and literature. Areas of exploration include the fundamentals of leadership, ethical leadership, social capital, emotional intelligence and three-dimensional leadership. Prerequisites: ENMA 601 or Ph.D. standing.

ENMA 888. Ph.D. Seminar. 1 Credit.
Discussion of research projects, topics, and problems of Engineering Management faculty, researchers, and students. A weekly exchange of ideas and issues between faculty and Ph.D. students focused on doctoral research.

ENMA 892. Doctor of Engineering Project. 1-9 Credits.
Directed individual study applying advanced-level technical knowledge to identify, formulate, and solve a complex, novel problem in Engineering Management.

ENMA 895. Topics in Engineering Management. 1-3 Credits.
Special topics of interest with emphasis placed on recent developments in engineering management.

ENMA 896. Topics in Engineering Management. 3 Credits.
Special topics of interest with emphasis placed on recent developments in engineering management.

ENMA 897. Independent Study in Engineering Management. 1-3 Credits.
Designed for advanced individualized study into an engineering management topic area. Independent study projects will be related to engineering management and completed under the supervision of a certified faculty member. Prerequisites: Permission of the instructor and Graduate Program Director.

ENMA 898. Research in Engineering Management. 1-12 Credits.
Supervised research prior to passing Ph.D. candidacy exam. Prerequisites: ENMA 721/ENMA 821 and permission of Graduate Program Director.

ENMA 899. Doctoral Research. 1-12 Credits.
Doctoral research hours. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete. Prerequisites: ENMA 821 and permission of instructor.

ENMA 999. Engineering Management 999. 1 Credit.
A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

ENVH - Environmental Health

ENVH 501. Occupational Health. 3 Credits.
An introduction to the industrial environment relative to health problems and the etiologically related agents.

ENVH 502. Environmental Health Administration and Law. 3 Credits.
A review of the concepts and practice of administering environmental health control programs within agencies at the federal, state and local levels. The principles of administration and leadership of programs in the private sector are also discussed. The constitutional, statutory and administrative law bases for organizing and conducting such programs and developing environmental policy as well as the legal implications of enforcement will be addressed. A review of all major environmental statutes and their agencies that enforce them will be addressed. (This is a writing intensive course.).

ENVH 506. Principles of Occupational Safety and Health. 3 Credits.
A broad overview of the field of safety. A study of the factors influencing the occurrence of accidents and incidents is set in the context of safety legislation, current issues in the practice of safety and the ethical and professional responsibilities of the safety practitioner. The course also includes discussions of product safety, fire prevention and protection systems safety and human elements in loss prevention.

ENVH 507. Occupational Safety Standards, Laws and Regulations. 3 Credits.
A review of the important Occupational Safety and Health Standards and Codes with particular emphasis on application of these codes to typical work situations. Governmental enforcement methodologies are also discussed.

ENVH 520. Communicable Diseases and Their Control. 3 Credits.
An in-depth study of the communicable disease processes as they pertain to environmental sources. A detailed discussion of specific communicable diseases that are manifested by various environmental etiologic agents. Various environmental control measures to prevent the incidence of communicable diseases are presented.

ENVH 521. Food Safety. 3 Credits.
A comprehensive study of food and milk production, processing and preservation and controls exercised for the prevention of foodborne illnesses and spoilage.

ENVH 522. Water and Wastewater Technology. 3 Credits.
Introduction to water quality management and wastewater treatment technology. Topics include the effect of organic, inorganic and thermal pollutants in water quality streams, waterborne diseases, monitoring concepts, methods of water quality management, regulatory considerations, theory and application of wastewater treatment concepts, wastewater characterization, and treatment methods and disposal methods.

ENVH 523. Vector Control. 3 Credits.
A study of the vectors of human disease and the methods utilized in their control. (offered spring).

ENVH 524. Residential and Institutional Environments. 3 Credits.
A study of the physical aspects of housing and institutions as they relate to human health and well-being. Coverage is also given to infection control in health-care facilities.
ENVH 525. Occupational Safety and Health Program Management. 3 Credits.
The establishment, implementation and maintenance of occupational safety and health programs. Paradigms of safety, techniques for safety training and creation of value for safety among business managers and employees are emphasized.

ENVH 526. Physical Hazards and Their Control. 3 Credits.
An in-depth examination of the varied types of physical hazards in the work environment and the methods of prevention, recognition and control.

ENVH 540. Principles of Ergonomics. 3 Credits.
An introduction to the terminology, concepts and applications of physiology, anthropometry, biomechanics and engineering to workplace and work methods design. Emphasis will be given to workplace design and work methods for job safety and health.

ENVH 541. Industrial Hygiene. 3 Credits.
An in-depth study of the chemical and physical agents responsible for occupational illness and the methods used for their measurement, evaluation and control.

ENVH 542. Sampling and Analysis Laboratory. 2 Credits.
Use and application of sampling and analytical equipment for measurement of chemical agents in the environment. Includes collecting media selection, sampling strategy, sample preparation and analysis. Prerequisites: ENVH 541 or permission of the instructor.

ENVH 545. Air Pollution and Its Control. 3 Credits.
The study of air pollution in relation to air quality criteria, pollutant production, atmospheric evolution, measurement and control techniques.

ENVH 546. Physical Hazards Laboratory. 2 Credits.
Use and application of sampling methods and equipment for measurement of physical hazards in the work environment. Includes aspects such as ergonomics, noise, vibration and radiation. Prerequisites: ENVH 541 or permission of the instructor.

ENVH 548. Epidemiology and Biostatistics. 1-3 Credits.
An introductory course in the principles and practices of epidemiology and the application of statistical and mathematical design and analysis of health research studies for the understanding and control of population health and disease with emphasis on environmental applications.

ENVH 561. Hazardous Waste Management. 3 Credits.
Description of the hazardous waste problem, the fundamentals of the chemistry involved with hazardous waste transport, methods of identification, assessment, control, and disposal of toxic and hazardous waste are discussed. In addition the relevant legal statutes, risk assessment, emergency response and case studies are presented. Introduction to the toxicological effects of exposure to hazardous waste is discussed.

ENVH 565. Hazardous Materials Management. 3 Credits.
The management of hazardous materials involves a wide array of interlocking regulations addressing use, manufacturing, exposure, storage, shipping and disposal. A life cycle review of hazardous materials highlighting best practices and legislation is presented. Useful in preparation for CHMM examination.

ENVH 566. Environmental Risk Assessment and Decision Analysis. 3 Credits.
The principles of quantitative health risk assessment of toxicants are presented. Qualitative and quantitative skills necessary to evaluate the probability of injury, disease, or death in the general population from exposure to environmental contaminants are discussed. Hazardous identification, exposure assessment, dose-response evaluation and risk characterization are emphasized. Risk management group projects assessing some real environmental risks is an important segment of the class.

ENVH 570. Industrial Environmental Management. 3 Credits.
Course addresses day-to-day technical and management aspects of environmental compliance, as well as regulatory issues faced in industrial applications. Includes audits and inspections, air and water pollution and hazardous waste.

ENVH 595. Topics in Environmental Health. 1-3 Credits.
Advanced study of selected topics.

ENVH 598. Independent Study in Environmental Health. 1-3 Credits.
An opportunity is afforded students to undertake independent study under the direction of a faculty member. Prerequisites: permission of the Program Director.

ENVH 600. Principles of Environmental Health Science and Protection. 3 Credits.
An introduction to the chemical, physical and biological factors affecting human health and well being. The emphasis is on the application of controls to prevent disease and maximize environmental quality. (Cross-listed with CHP 602).

ENVH 602. Environmental Health Law and Policy. 3 Credits.
Prerequisites: MPH 610 and MPH 613. A review of the concepts and practice of administering environmental health control programs within agencies at the federal, state and local levels. The principles of administration and leadership of programs in the private sector are also discussed. The constitutional, statutory and administrative law bases for organizing and conducting such programs and developing environmental policy as well as the legal implications of enforcement will be addressed. A review of all major environmental statutes and their agencies that enforce them will be addressed.

ENVH 603. Environmental Epidemiology. 3 Credits.
Collection methods, analysis and interpretation of epidemiologic data with environmental and occupational disease emphasis.

ENVH 610. Food Microbiology. 4 Credits.
An in-depth examination of requirements for growth of food borne disease organisms. Includes hazard analysis and critical control point methodology.

ENVH 611. Water Pollution Control. 4 Credits.
A study of the chemical, physical and biological causes of surface and groundwater pollution. Emphasis is given to onsite wastewater systems and protection of groundwater supplies.

ENVH 621. Advanced Toxicology I. 4 Credits.
An in-depth study of the adverse interaction of environmental and occupational chemical agents with humans. Students critically review articles from the current toxicology literature with regard to scientific content, methods and conclusions. Each student presents at least two reviews during the semester. Prerequisites: ENVH 543.

ENVH 643. Principles of Toxicology. 3 Credits.
An introduction to the fundamentals of toxicology with emphasis on the interaction of environmental and industrial chemicals with humans are studied. Exposure, dose response, kinetics and distribution of toxicants, metabolism of toxic agents, factors that affect toxicity and introductory chemical carcinogenesis are discussed.

ENVH 695. Selected Topics in Environmental Health. 1-3 Credits.
The study of selected topics that may not offered regularly. Special topics will appear in the schedule of classes each semester.

ENVH 722. Control of Hazards in the Workplace. 3 Credits.
Advanced methods for evaluation and control of hazards in the workplace.

ENVH 795. Selected Topics in Environmental Health. 1-3 Credits.
The study of selected topics that may not be offered regularly. Special topics will appear in the schedule of classes each semester. Prerequisites: permission of the instructor.

ENVH 822. Control of Hazards in the Workplace. 3 Credits.
Advanced methods for evaluation and control of hazards in the workplace.

ENVH 895. Selected Topics in Environmental Health. 1-3 Credits.
The study of selected topics that may not be offered regularly. Special topics will appear in the schedule of classes each semester. Prerequisites: permission of the instructor.
FIN 633. The Legal Environment of Business and the Age of Electronic Commerce. 3 Credits.
Prerequisite: graduate standing. An understanding of the traditional legal environment of business issues is essential for management to successively utilize e-commerce and respond to legal problems that it will present. The course therefore examines dispute resolution, constitutional, tort, criminal, contract and property law, both in the context of traditional business practice and as applied to e-commerce.

FIN 668. Finance Internship. 1-3 Credits.
1-3 credits. Prerequisites: FIN 605, graduate standing, and permission of the department chair. The course is a practicum in the field of finance, applying theories, concepts, and financial management tools in a business environment.

FIN 679. Selected Topics in Finance. 1-3 Credits.
1-3 credits. Prerequisites: permission from the department chair and the graduate program director. Study designed for students who have had one or more of the required courses waived, or for students desiring additional work in a finance area of particular interest.

FIN 690. Selected Topics in Real Estate. 3 Credits.
3 hours; 3 credits. Prerequisites: permission from the department chair and the graduate program director. Study designed for students who have had one or more of the required courses waived, or for students desiring additional work in an insurance area of particular interest.

FIN 699. Selected Topics in Insurance. 3 Credits.
3 hours; 3 credits. Prerequisites: permission from the department chair and the graduate program director. Study designed for students who have had one or more of the required courses waived, or for students desiring additional work in an insurance area of particular interest.

FIN 710. Futures and Options. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: FIN 605. In no area of finance is the interface between academic theory and real-world practice as close as in the case of futures and options. We have now reached a stage where it is essential that all finance professionals understand how these markets work, how they can be used, and what determines prices in them. This course addresses all these issues.

FIN 741. Corporate Financial Policy and Control. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: FIN 605. The course will comprise mainly cases but there will be some lecturing particularly on material not covered in FIN 605.

FIN 795. Selected Topics in Finance. 3 Credits.
3 hours; 3 credits. Prerequisites: Ph.D. standing and permission of the chair and coordinator. Designed to provide the advanced student with an opportunity to study independently or in small groups and investigate specific topics of current interest in the field of finance.

FIN 835. Portfolio Analysis. 3 Credits.
A mathematical analysis of modern investment theory. Analyzes return and risk characteristics of individual securities and portfolios and develops valuation models of various financial instruments.

EXSC 528. Exercise Physiology II. 3 Credits.
A study of pathophysiology of common diseases with concentration in the design, implementation and administration of exercise prescription for a variety of chronic diseases.

EXSC 531. Wellness Programming and Administration. 3 Credits.
An introduction to the principles of administration and implementation of fitness and wellness programs to individuals, groups, centers and corporate settings.

EXSC 599. Exercise Science 999. 1 Credit.
A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

FIN - Finance

FIN 605. Financial Management. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ACCT 601 and BNAL 600. The course develops basic concepts of shareholders wealth maximization, net present value, security valuation, risk-return analysis, capital budgeting, cost of capital, capital structure, and dividend policy.

FIN 610. Principles of Risk and Insurance. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisites: graduate standing and permission of the graduate program director. Risk theory as applied to the various fields of insurance, including life, health, property-liability and employee benefits.
FIN 837. International Financial Management. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: FIN 605. Examines such topics as the financial aspects of international business including financing and hedging activities of firms involved in international transfers of goods and services and decision making in connection with the asset management financing activities of multinational corporations.

FIN 860. Advanced Financial Theory. 3 Credits.
Seminar 3 hours; 3 credits. Prerequisite: FIN 738/838. This course discusses the building blocks which much of financial theory is based on. In addition, a number of current topics in the literature are analyzed. Students are expected to read many of the original journal articles.

FIN 861. Seminar in Investments. 3 Credits.
Seminar 3 hours; 3 credits. Prerequisites: FIN 737/837. The purpose of this course is to be acquainted with recent theoretical and empirical literature on investments, portfolio management and speculative instruments. Emphasis will be placed on the development of methodological approaches to the various research problems.

FIN 862. Seminar in International Finance. 3 Credits.
Seminar 3 hours; 3 credits. Prerequisites: FIN 737/837. This course is designed to provide an in-depth understanding of the key issues of international financial management. Topics covered include balance of payments, interest rates, international capital flows/markets and asset pricing, foreign exchange risk management, and international capital budgeting.

FIN 863. Seminar in Current Financial Topics. 3 Credits.
Seminar 3 hours; 3 credits. Prerequisites: FIN 737/837, and 735/835. This course is structured to provide the student with research developments that lie on the frontier of corporate financial management. Topics covered include optimal investment and financing decisions, cost of capital, option pricing theory, equilibrium valuation models, efficient capital markets, capital structure, dividend policy, mergers and acquisitions, and international financial management.

FIN 864. Directed Research Seminar. 3-6 Credits.
Lecture 3 hours; 3 credits. Corequisite: FIN 860. Prerequisite: FIN 861. This course represents an advanced study of empirical research methods in finance. It focuses on the empirical techniques used most often in the analysis of financial markets and how they are applied to actual market data. Topics include: statistical properties of asset returns, nonlinear dynamics, and volatility modeling of financial assets.

FIN 895. Selected Topics in Finance. 3 Credits.
3 hours; 3 credits. Prerequisites: Ph.D. standing and permission of the chair and coordinator. Designed to provide the advanced student with an opportunity to study independently or in small groups and investigate specific topics of current interest in the field of finance.

FIN 899. Dissertation. 1-12 Credits.
1-12 credits. Prerequisite: FIN 863. An approved research project, written under the supervision of a faculty advisor, in which the student demonstrates the ability to conduct original research. The complete project must be approved by the dissertation committee.

FLET - Foreign Lit In English Trans

FOREIGN LIT IN ENGLISH TRANS Courses

FLET 510. Berlin-Paris: Crucibles of European Ideas. 3 Credits.
Lecture 3 hours; 3 credits. This course explores the cultural movements that have characterized the German-French commonalities and differences from the early 1900s through the 1990s in cross-disciplinary discourses such as film, literature, art, politics, and economics.

FLET 545. German Cinema, 3 Credits.
Lecture 2 hours; laboratory 2 hours; 3 credits. This course will focus on the German cinema from perspectives such as fascism and its legacy, film as historical critique, or Weimar cinema.

FLET 571. Hispanic Women Authors, 3 Credits.
Lecture 3 hours; 3 credits. A study of fictional and non-fictional works by Spanish, Spanish-American, and U.S. Latina writers from the 16th to the 20th century. The course analyzes gender identity and roles and the interaction of gender, race, and class in literary representations of courtship and marriage, spirituality, nationalism, colonialism, and multiculturalism.

FLET 576. German-Jewish Literature and Culture. 3 Credits.
Lecture 3 hours; 3 credits. A survey of seminal texts by German-Jewish authors from the Enlightenment to the present day, including figures such as Marx, Kafka, Freud, Schnitzler and Arendt. Taught in English.

FLET 595. Topics in Foreign Literature in English Translation. 1-3 Credits.
1-3 credits each semester. The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule and will be more fully described by academic advisors.

FLET 596. Topics in Foreign Literature in English Translation. 1-3 Credits.
1-3 credits each semester. The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule and will be more fully described by academic advisors.

FOUN - Foundations Of Education

FOUNDATIONS OF EDUCATION Courses

FOUN 611. Introduction to Research Methods in Education. 3 Credits.
Lecture 3 hours; 3 credits. Course can’t be repeated for credit. The primary goal of the course is to provide students with the knowledge and skills to access, evaluate, and synthesize empirical research. The course examines types of educational research and criteria for evaluating empirical studies. It introduces various types of research questions and associated research designs, components of research reports, sampling, validity of measures, threats to internal and external validity, and simple statistics.

FOUN 612. Applied Research Methods in Education. 3 Credits.
Lecture 3 hours, 3 credits. The primary goal of this course is to provide students with the knowledge and skills to write a research proposal and conduct research. It is intended for those students who are completing a thesis to meet their program requirements, those planning on pursuing a doctoral degree, or those who anticipate conducting research for any other reasons. The course examines types of educational research and criteria for selection of topics for research projects; describes criteria for effective collection and organization of data; review of literature; analysis of data and proposal writing.

FOUN 615. Research and Application of the Evolution of Education: History, Issues, Technology and Assessment. 3 Credits.
Lecture 3 hours, 3 credits. Course focuses on foundations of U.S. education system; legal aspects for educational delivery in the U.S. and Virginia; use and contributions of technology integration to learning outcomes; formative and summative assessment for improving learning outcomes of urban children and youth.

FOUN 640. Fundamentals of Measurement and Assessment. 3 Credits.
Lecture 3 hours, 3 credits. This course stresses the use of measurement and assessment for evaluation and decision making focusing on basic concepts applicable to all types of assessment: statistical concepts, reliability, validity, and intuitive frameworks for cognitive and non-cognitive measures.

FOUN 641. Assessment and Evaluation of Student Learning, 3 Credits.
Lecture 3 hours, 3 credits. The valid use of formative and summative assessment and evaluation principles for monitoring and promoting students’ learning and development will be addressed. Students will learn how to construct and use a variety of formal and informal teacher assessment procedures.
FOUN 650. Human Development and Student Learning. 3 Credits.
Lecture, 3 hours; 3 credits. Corequisite: Student must be a participant in the Teacher Residency Grant. This course will focus on understanding children’s and adolescents’ physical, social, emotional, intellectual, and speech/language development; integrating and incorporating children and adolescent differences (economic, social, racial, ethnic, religious, physical, and mental) into understanding developmental issues as they relate to instruction, including the identification and instruction of students with exceptionalities as well as special needs. Research related to the classroom application of these theories is examined and evaluated based on principles of research design and interpretation.

FOUN 662. Assessment and Evaluation for Schools Serving Military Connected Children and Families. 4 Credits.
Lecture, 3 hours; Service learning, 1 hour. 4 credits. Prerequisite: COUN 605 and acceptance into the Military Child and Family Education Certificate Program. This course is designed to create educators and educational support service providers capable of assessing the needs of military children and able to self-assess their schools in terms of the comprehensive elements of a military conscious and supportive school. Students will become familiar with the Military Consciousness Assessment Toolkit (Mil-CAT), a comprehensive and dynamic self-assessment tool developed at ODU that provides a process and system for analyzing and prioritizing support structures and needs of military students across the school. Students will also apply basic constructs of assessment in order to develop skills for determining the individual academic, social, and emotional needs of military students and their families, as well as to design ways to assess classroom and school-wide interventions. Use of assessments of individual, group, and school-wide needs to design, implement, and evaluate contextually tailored interventions that support military connected students will be modeled and practices. This course is required for completion of the Military Child and Family Education graduate certificate. Students must be accepted to the certificate program or receive approval from the certificate program director in order to enroll.

FOUN 722. Introduction to Applied Statistics and Data Analysis, 3 Credits.
Lecture 3 hours, 3 credits. Introduction to basic topics in statistical analysis, including descriptive statistics and simple inferential statistics such as correlation, regression, t-tests, one-way analysis of variance, and chi-square.

FOUN 770. Formative Assessment of Student Learning for School Leaders and Curriculum Specialist. 3 Credits.
Lecture 3 hours, 3 credits. Overview of advanced educational measurement and assessment ideologies as well as methods. Students will identify, critique, construct and administer educational measures. Psychometric topics such as reliability and validity will be explored as well as advanced assessment issues such as scale construction and item response theory.

FOUN 812. Advanced Research Design and Analysis. 3 Credits.
Lecture 3 hours, 3 credits. This course focuses on the application of advanced research design as it is applied in various educational disciplines. It provides an in-depth examination of quantitative research approaches, sampling techniques, threats to validity, ethical considerations and reviewing, writing quantitative methodology descriptions for research proposals and reports.

FOUN 813. Advanced Program Evaluation in Education. 3 Credits.
Lecture 3 hours, 3 credits. Examines procedures and problems in the design and utilization of program evaluation in education. Identifies evaluation purposes and the methods of evaluation especially as affected by organizational behavior, ethical considerations, and political influences. Evaluation methodology includes, but is not limited to, design considerations, data utilization, and teacher evaluation. Both quantitative and qualitative strategies will be covered.

FOUN 814. Qualitative Research Design in Education. 3 Credits.
Lecture 3 hours, 3 credits. This course concentrates on the theoretical underpinnings of qualitative research; methodology and methods incuding identification of ways to collect and analyze qualitative data; examination of ethical issues; development of proposals; and writing up studies.

FOUN 815. Advanced Qualitative Research. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: FOUN 814 Qualitative Research. Instructor approval required. This advanced course focuses on various forms of interpretive inquiry and the purposes and methods of methodologies including phenomenology, hermeneutics, and ethnography.

FOUN 816. Single Subject Research Designs. 3 Credits.
Lecture 3 hours, 3 credits. This course is designed to provide the student knowledge and skills that relate to single subject methodology. It includes an overview of historical and philosophical foundations, basic issues in behavioral assessment, and single subject research and design methodology, including trend and statistical analysis in single subject research. Students will analyze critically empirical research and be able to plan, implement, and evaluate original research.

FOUN 822. Applied Linear Models in Educational Research. 3 Credits.
Lecture 3 hours, 3 credits. Prerequisite: FOUN 722. Introduction to the general linear model with emphasis on concepts and applications of multiple linear regression (MLR) to problems in educational research. Topics include estimation and interpretation of MLR models, relationships between MLR and analysis of variance (ANOVA), logistic regression analysis, and trend analysis.

FOUN 823. Analysis of Variance Applied to Educational Research. 3 Credits.
Lecture 3 hours, 3 credits. Prerequisite: FOUN 722. Introduction of analysis of variance models as applied in education and human services, including two-way and three-way factorial designs, analysis of covariance, repeated-measures, and mixed-model analysis.

FOUN 824. Design and Analysis for Causal Inference in Educational Contexts. 3 Credits.
Lecture 3 hours, 3 credits. Prerequisites: FOUN 822 and 823 or permission of instructor. Introduction to research design and statistical analysis for studies intended to support causal inferences. Topics include experimental, quasi-experimental, and ex post facto design and appropriate models for data analysis.

FOUN 825. Applied Multilevel Modeling in Educational Research. 3 Credits.
This course focuses on advanced applications of statistics that are used in educational research in various educational disciplines. Specifically, the course will offer an introduction to hierarchical linear modeling (HLM) of nested data as applied to education. Topics include conceptual and statistical background of two- and three-level designs, cross-level interaction effects, and application of multilevel models for repeated measures designs. Emphasis is on estimation, interpretation, and diagnostics for multilevel models of continuous outcomes. Prerequisites: FOUN 822 and FOUN 823 or instructor permission.

FOUN 826. Applied Structural Equation Modeling in Educational Research. 3 Credits.
Introduction to structural equation modeling and related multivariate procedures applied to research problems in education. Topics include a brief review of exploratory factor analysis, confirmatory (structural) factor analysis, path analysis, and structural equation modeling with observed and latent variables. Prerequisite: FOUN 822 and FOUN 823 or permission of instructor.

FOUN 827. Applied Logistic Regression. 3 Credits.
A practical and conceptual introduction to applying logistic and probit) regression models to typical questions in the social sciences. Will utilize SPSS for practical applications covering simple and multiple regression models, interactions and curvilinear effects, multinomial models, testing of assumptions, and select advanced applications such as propensity score matching and missing data analysis. Prerequisites: FOUN 822 and FOUN 823 or permission of instructor.

FOUN 830. Theories of Learning and Instruction. 3 Credits.
Lecture 3 hours, 3 credits. The course consists of critical discussion and analysis of major learning theories that have influenced learning and instruction in today’s schools. Applications of current research to instructional design will be emphasized.
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GEOG 502. Geographic Information Systems. 3 Credits.
A study of the conceptual basis of GIS as a tool for manipulating spatial information. The course focuses on how geographic information can be input and organized within the framework of a GIS. Students will work on a computer-based GIS to gain a greater understanding of spatial database structures and analytical operations.

GEOG 504. Digital Techniques for Remote Sensing. 3 Credits.
Study of the theory and application of remote sensing, emphasizing environmental applications and aerial and satellite imagery. Covers the fundamentals of multispectral digital image processing, including sensors pre-processing, enhancement, classification, accuracy assessment, and GIS data integration.

GEOG 505. Seminar in International Resource Management. 3 Credits.
Discussion of the ecological and management principles underlying international resource management and the goal of attaining a sustainable, ecologically balanced world.

GEOG 508. Cartography. 3 Credits.
Computer-assisted methods and techniques employed in the design, construction, and use of maps and other graphics as tools for data analysis and communication.

GEOG 510. Seminar in Urban Geography. 3 Credits.
Discussion of specific urban and metropolitan problems based on outside readings and individually selected research topics.

GEOG 511. Urban and Regional Planning. 3 Credits.
A study of planning concepts and powers used to guide contemporary metropolitan growth and development. Emphasis is on the application of social science principles and methods to the planning process.

GEOG 512. Cities of the World. 3 Credits.
An examination of cities of the world's major cultural realms with an emphasis on the urban landscape as it varies between developed and developing countries.

GEOG 519. Spatial Analysis of Coastal Environments. 3 Credits.
The course integrates remotely sensed and field techniques for scientific investigation and practical management of coastal environmental systems. Spatial modeling of coastal processes and management tools using Geographic Information System (GIS). Prerequisites: GEOG 504.

GEOG 520. Marine Geography. 3 Credits.
An analysis of human-sea relationships with particular emphasis on resource management and political organization from global, regional, and national perspectives.

GEOG 522. Coastal Geography. 3 Credits.
An examination of the physical and human geography of the coastal zone. Considers problems of managing coastal resources with an emphasis on North America. Lectures focus on coastal patterns, processes, and problems at the global, national, and local scales. Students investigate a section of the local coastline and write a report on the physical and human geography on the basis of field study, library, and internet research.

GEOG 525. Internet Geographic Information Systems. 3 Credits.
Prerequisites: GEOG 502. Theoretical and practical exploration of methods, standards, and policies related to the development and utilization of geographic information systems on the Internet. Students will create and utilize distributed geospatial data and analytical systems using the WWW and the Internet to address geographical problems.

GEOG 532. Advanced GIS. 3 Credits.
The study of a series of advanced topics in the field of geographic information systems/science. Focus is placed on the development of projects/models and a survey of several advanced techniques. Students will work on a computer based GIS to implement topics from lectures. Prerequisites: GEOG 502.

GEOG 551. Europe. 3 Credits.
A geographical analysis of the interrelationships among physical, cultural, economic, and political factors in Europe.

GEOG 552. Africa. 3 Credits.
A geographical analysis of the interrelationships among physical, cultural, economic, and political factors in Africa.

GEOG 553. Asia. 3 Credits.
A geographical analysis of the interrelationships among physical, cultural, economic, and political factors in Asia excluding the Middle East and the former USSR.

GEOG 554. Latin America. 3 Credits.
A geographical analysis of the interrelationships among physical, cultural, economic, and political factors in Latin America.

GEOG 555. The Middle East. 3 Credits.
A geographical analysis of the interrelationships among physical, cultural, economic, and political factors in the Middle East.

GEOG 556. Geography of Southeast Asia. 3 Credits.
Analysis of the physical, historical, cultural, economic, environmental, and political patterns and problems of Southeast Asia. The focus is on the diversity of the region and on the nature and impact of development.

GEOG 558. Geography of Virginia. 3 Credits.
An analysis of Virginia’s population, resources, and regional landscapes as they have been influenced by physical, cultural, historical, and economic factors.

GEOG 590. Applied Cartography/GIS. 1-3 Credits.
Practical experience in applying the principles of cartography and geographical information systems to the design and construction of maps and other graphics.

GEOG 595. Topics in Geography. 1-4 Credits.
The advanced study of selected topics which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule, and will be more fully described in information distributed to academic advisors.

GEOG 596. Topics in Geography. 1-4 Credits.
The advanced study of selected topics which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule, and will be more fully described in information distributed to academic advisors.

GEOG 597. Independent Research in Geography. 1-3 Credits.
Independent reading and study on a topic to be selected under the direction of the instructor. Conferences and papers as appropriate.

GEOG 598. Tutorial Work in Geography. 1-3 Credits.
Independent research under the supervision of a faculty member.

GEOG 599. Seminar in Political Geography. 3 Credits.
A study of the interrelationships of political and geographic phenomena, and theories of geopolitics; examines in a seminar format the political geography both of specific topics such as the national integration of states, refugees and resources, and of particular regions of the world.

GEOG 625. Ethno-Regionalism. 3 Credits.
An examination of the geopolitics of world ethnic minorities with special reference to selected “trouble spots” on the world political map.

GEOG 650. Seminar in Regional Geography. 1-3 Credits.
Advanced seminar on a particular country or world region.

GEOG 668. Internship. 1-6 Credits.
Individualized practical experience.

GEOG 695. Selected Topics in Geography. 1-3 Credits.
Advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest.

GEOG 696. Selected Topics in Geography. 1-3 Credits.
Advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest.

GEOG 697. Independent Research in Geography. 1-3 Credits.
Independent research in geography under the supervision of a faculty member.
GER - German

GERMAN Courses

GER 507. Advanced Grammar and Syntax. 3 Credits.
Lecture 3 hours; 3 credits. This course deals with idioms and the fine points of grammar with the aim of helping students to develop a good style in written German. Special problems of non-native speakers are analyzed and treated individually.

GER 508. Conversation and Composition. 3 Credits.
Lecture 3 hours; 3 credits. Designed to develop the mastery of spoken and written German. Recommended for prospective teachers.

GER 510. Berlin and Paris: Crucibles of European Ideas. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: German and French students must read and write in the target language. This course explores the cultural movements that have characterized the German-French commonalities and differences from the early 1900s through the 1990s in cross-disciplinary discourses such as film, literature, art, politics, and economics. Cross-listed with FLET 510.

GER 520. Masterpieces of German Poetry. 3 Credits.
Lecture 3 hours; 3 credits. The course will focus on exemplary poems of distinct cultural periods, ranging from the courtly love tradition of the Middle Ages to the political poetry surrounding the fall of the Berlin Wall.

GER 545. German Cinema. 3 Credits.
Lecture 2 hours; laboratory 2 hours; 3 credits. This course will focus on the German cinema from perspectives such as fascism and its legacy, film as historical critique, or Weimar cinema. (Cross-listed with FLET 545 and COMM 544).

GER 550. German Satires and Parodies. 3 Credits.
Lecture 3 hours; 3 credits. The course will analyze satirical features and parodic strategies in exemplary literature and visual texts from late medieval carnival plays to contemporary cabaret. Texts include excerpts from Brant’s Ship of Fools, examples of romantic irony in Bonaventura and Heine, the graphic art of caricature from Reformation broad sheets to today’s political cartoons, as well as literary parodies from Wagnerian opera to Viennese chanson.

GER 555. Germany 1900-1945: From High Culture to Holocaust. 3 Credits.
Lecture 3 hours; 3 credits. A study of representative works from the last years of the Austro-Hungarian Empire, the Wilhelmine Empire and the Weimar Republic, including Freud, Hofmannsthal, Kafka, Brecht, Hesse, Thomas Mann et al. The course will also discuss literature illustrating the genesis and ideology of the Third Reich.

GER 570. Post World War II Germany. 3 Credits.
Lecture 3 hours; 3 credits. The course will cover representative literary texts and cultural events of divided and united Germany, including Heinrich Böll, Günter Grass, Max Frisch, Christa Wolf, Doris Dörrie et al, as well as film, painting, popular music, the culture of memory and German Jewish relations after the Shoah.

GER 573. The Enlightenment and Its Critics. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on German intellectual history as represented by thinkers such as Lessing, Kant, Hegel, Marx, Nietzsche, and Freud. More recent works by Frankfurt School writers Adorno and Horkheimer represent critical engagements with the tenets of the European Enlightenment.

GER 576. German-Jewish Literature and Culture. 3 Credits.
Lecture 3 hours; 3 credits. A survey of seminal texts by German-Jewish authors from the Enlightenment to the present day, including figures such as Marx, Kafka, Freud, Schnitzler and Arendt. (cross-listed with FLET 576).

GER 578. German Drama. 3 Credits.
Lecture 3 hours; 3 credits. An exploration of German dramatic works ranging from the Enlightenment period to contemporary drama. Students will read individual works by authors such as Lessing, Goethe, Schiller, Hebbel, Brecht, or Jelinek as well as texts concerned with the function of drama in German culture by these and other authors.

GER 595. Topics in German. 1-3 Credits.
1-3 credits each semester. Prerequisite: appropriate survey course or permission of the instructor. The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule and will be more fully described by academic advisors.

GER 596. Topics in German. 1-3 Credits.
1-3 credits each semester. Prerequisite: appropriate survey course or permission of the instructor. The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule and will be more fully described by academic advisors.

HE - Health Education

HEALTH EDUCATION Courses

HE 502. Methods and Materials in Health Education. 3 Credits.
Instruction in methods of teaching, organization of classes, evaluation of outcomes, and selection of content for health and safety education. Collection, evaluation, and application of health and safety education materials are emphasized. This course is to be completed prior to student teaching. Field experience is required.

HE 581. Teaching Sexuality Education in Schools. 3 Credits.
This course is concerned with suitable methods and materials for use in teaching sex education in the home, community, and school setting. A family living element is in the program. Prerequisites: PE 300 and junior standing.

HE 597. Topics in Health Education. 1-3 Credits.
This course provides an opportunity for in-depth study of selected topics in the variety of areas constituting health education.

HE 598. Topics in Health Education. 1-3 Credits.
This course provides an opportunity for in-depth study of selected topics in the variety of areas constituting health education.

HIED - Higher Education

HIGHER EDUCATION Courses

HIED 668. Internship in Higher Education Administration. 3-6 Credits.
Prerequisites: permission of instructor, COUN 633, 635, 707/807 and HIED 708/808 and 745/845. The university advisor and site supervisor will work with the student to develop and implement a set of objectives intended to familiarize the student with the operation of an administrative area within an institution of higher education, to assist the student to acquire practical skills in the operation of that office and to develop skills that are transferable to other administrative areas.
HIED 708. Contemporary Issues in Higher Education. 3 Credits.
Lecture and discussion 3 hours; 3 credits. This course is intended to present a broad exploration and generate greater understanding of contemporary issues influencing higher education that will involve discussion, written and oral reports and the integration of knowledge across the spectrum of issues relating to higher education.

HIED 710. Introduction to Student Affairs Administration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: COUN 707. This course is intended to be an introduction to the practice of student affairs work in American Higher Education. It will introduce students to the theoretical foundations of student affairs. It will also provide students with a structural framework for student affairs organization, problems, issues and ideas.

HIED 712. Strategic Planning and Institutional Effectiveness. 3 Credits.
Lecture 3 hours; 3 credits. Strategic Planning and institutional effectiveness is becoming more and more important to institutions as funding sources change and students demand quality. This course will examine how these processes can be carried out on American campuses.

HIED 720. The Private College and University. 3 Credits.
Lecture 3 hours; 3 credits. The U.S. Higher Education system contains great diversity due to the inclusion of private institutions. This course will examine the structure and organization of Higher Education in the U.S. as well as differences and similarities between private and public institutions.

HIED 730. Seminar in Student Affairs Administration. 3 Credits.
Lecture 3 hours; 3 credits. This course provides synthesis, integration, and application of prior coursework; discussion topics include: college students and their environments, student learning and development, administrative issues, ethical decision-making, leadership and staff development, current “hot topics” in student affairs, and counseling and helping skills. A significant portion of the class is spent discussing and actively observing in student affairs areas that are engaged in program development and implementation, environmental needs and assessments, program evaluation, and advising student groups. The final part of the course coveres the transition to professional student affairs roles.

HIED 731. Group Dynamics in Higher Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: HIED 733 or permission of the instructor. This course examines the principles and dynamics of group interactions and processes while providing strategies for working with groups in higher education settings (ex. Focus groups; task groups; and student staff, faculty, and parent groups). Students will explore and develop their leadership skills specifically related to forming compatible groups capable of completing tasks that compliment the mission, vision, and goals of an institution of higher education.

HIED 733. Professional Helping Skills in Higher Education. 3 Credits.
Lecture 3 hours; 3 credits. This course will focus on developing the knowledge, attitude and skills essential to working with individuals seeking assistance with problems that they face while in college. Listening and interviewing skills will be addressed.

HIED 737. Academic Issues In Higher Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: HIED 759. This course involves various learning methods to develop an analysis of the academic core function in higher education and the roles and responsibilities involved in various forms of educational delivery.

HIED 743. Introduction to International Higher Education Administration. 3 Credits.
Lecture 3 hours; 3 credits. This course surveys key aspects of international higher education administration in an American university setting, including study abroad, recruitment and admission of international students, international student and scholar services, and English language preparation.

HIED 744. Comparative Higher Education Systems. 1.3 Credit.
Lecture 3 hours; 3 credits. This course presents the development of the three primary systems of higher education in the world today: the U.S., British and European (Confidential) systems. It will also, as appropriate, examine other systems of higher education from around the world.

HIED 745. Today’s College Student and Diversity. 3 Credits.
Lecture and discussion 3 hours; 3 credits. This course is a sociological survey of theoretical and research literature describing college students from multiple views. These include demographic profiles; undergraduate student growth and development; cognitive and non-cognitive predictors of the impact of the collegiate experience; implications and outcomes of college attendance; and the specific characteristics of particular student populations.

HIED 752. The Law of Higher Education. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Legal perspectives related to higher education will be discussed as a major part of the course. Among the topics to be discussed will be the bases from which higher education law comes, current (case, state and regulatory) law, as well as risk management and liability issues for higher education. The remainder of the course will focus upon the ethical issues that must be faced when shaping and implementing institutional policy, curriculum and procedures. Some emphasis will be placed on the areas in which legal and ethical issues come into conflict. This course should be taken near the end of the master’s program.

HIED 756. Higher Education Finance. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: HIED 708 and 794. Higher Education Finance is an intensive course devoted to the examination of concepts and management practices in higher education finance. The course is intended to provide prospective college and university administrators with both a theoretical and working knowledge of techniques, issues, policy, and practices as they are related to management and administration of colleges and universities in the U.S.

HIED 757. The Multicultural University. 3 Credits.
Lecture 3 hours; 3 credits. Research, philosophical, and policy literature on multiculturalism in higher education administration and leadership is surveyed. Topics covered include demographics and multiculturalism, university mission, admission, program and student assessment and evaluation, benefits of multiculturalism, faculty roles and responsibilities, teaching and learning outcomes, recruiting and graduating multicultural students, inclusive curriculum design, and student services.

HIED 758. Higher Education Leadership. 3 Credits.
Lecture 3 hours; 3 credits. The course will provide students with the basic theory, knowledge and skills needed to be an effective leader within post-secondary educational institutions, with a primary focus on public, private and non-traditional four-year colleges and universities.

HIED 759. Higher Education Curriculum, 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: COUN 707/807, HIED 708/808. This course provides an introduction to the development and management of the curriculum within institutions of higher education.

HIED 761. Higher Education Capstone. 3 Credits.
Lecture 3 hours; 3 credits. The course is a culminating experience for the master’s degree intended to integrate and apply the knowledge gained in the degree programs to complex issues with policy and practice in higher education.

HIED 762. Development and Fund Raising. 3 Credits.
Lecture 3 hours; 3 credits. The major areas of institutional advancement and fund-raising form the fundamental outline for the course. Students will explore the professional literature and hear lectures from experts in the areas of: institutional marketing, event management, developing a campaign, use of the internet, donor identification and cultivation, planned giving, developing corporate partners, and foundation management.

HIED 763. Case Studies in Higher Education. 3 Credits.
Lecture 3 hours; 3 credits. This course consists of a thorough analysis of a variety of issues influencing higher education and the roles and responsibilities involved in various forms of educational delivery.

HIED 764. Educational Finance. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: HIED 708 and 756. Higher Education Finance is an intensive course devoted to the examination of concepts and management practices in higher education finance. The course is intended to provide prospective college and university administrators with both a theoretical and working knowledge of techniques, issues, policy, and practices as they are related to management and administration of colleges and universities in the U.S.

HIED 765. Higher Education Policy. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Legal perspectives related to higher education will be discussed as a major part of the course. Among the topics to be discussed will be the bases from which higher education law comes, current (case, state and regulatory) law, as well as risk management and liability issues for higher education. The remainder of the course will focus upon the ethical issues that must be faced when shaping and implementing institutional policy, curriculum and procedures. Some emphasis will be placed on the areas in which legal and ethical issues come into conflict. This course should be taken near the end of the master’s program.

HIED 766. Higher Education Leadership. 3 Credits.
Lecture 3 hours; 3 credits. The course will provide students with the basic theory, knowledge and skills needed to be an effective leader within post-secondary educational institutions, with a primary focus on public, private and non-traditional four-year colleges and universities.

HIED 767. Higher Education Curriculum, 3 Credits.
Lecture 3 hours; 3 credits. This course is intended to present courses of action available to decision-makers.
HIED 764. College and the University Presidency. 3 Credits.
This course is designed to provide greater understanding of the leadership role of college and university presidents and the multiplex of issues associated with the office of the presidency at the various types of American institutions. The course will utilize case study analysis, guest presentation, and review of the literature. There will be rigorous discussion, readings, and analyses in a collegial and reciprocal learning environment.

HIED 765. Adult and Continuing Education. 3 Credits.
An advanced seminar emphasizing the historical, philosophical, and institutional analyses of the development and status of adult and continuing education within the higher education community.

HIED 766. The Modern Community College. 3 Credits.
Lecture 3 hours; 3 credits. This course is a study of the institutional characteristics of the community college, including a review of the history, purpose, students, faculty, administration and organization, finance, and social functions. Considerable attention will be given to current issues facing community colleges. This course is an elective within the master’s program and a required course in the Ph.D. in Community College Leadership.

HIED 770. External and Internal Relations for Higher Education. 3 Credits.
Lecture, 3 hours. 3 credits. This course serves as an introduction for prospective and current administrators to the social and political context of the higher education environment and its various constituencies. It will teach them to recognize the impact of politics, socioeconomic situations, diversity, media, monetary issues, and equity issues on their leadership practices.

HIED 771. American Higher Education in a Global Context. 3 Credits.
This course is designed to broaden and deepen students’ understanding of contemporary developments in global higher education and to develop analytic skills for understanding the global social, political, and economic processes shaping U.S. higher education in particular. Research and policy literature on current issues in global higher education is used to examine topics including cross-border higher education, student and scholar mobility patterns, the impact of emerging technologies, and transnational research and development partnerships.

HIED 792. Higher Education and Society. 3 Credits.
3 credits. A graduate seminar that focuses on the sociopolitical contexts within which public policy for higher education is developed in the U.S. It examines who makes policy for higher education, how competing policy agendas are negotiated, and what broader forces affect the policy process.

HIED 793. The History of Higher Education in the United States. 3 Credits.
Lecture and discussion 3 hours; 3 credits. This course is designed to provide a broad overview of the historical development of higher education with a concentration on American higher education and its growth and development since the founding of Harvard in 1636. Because of its importance within the spectrum of higher education in the United States, some concentration will be spent upon the development of higher education in Virginia as well.

HIED 794. Organization and Administration of Higher Education in the United States. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Through lectures, visiting presenters, student presentations of literature, and projects and readings, this course is designed to be an introduction/survey of administration, organization and governance of higher education institutions in the United States. In addition to introducing students to the issues, this experience is intended to help students understand the competencies and training necessary to undertake various operational roles in higher education.

HIED 795. Topics in Higher Education Administration. 1-6 Credits.
1-3 credits. Prerequisite: permission of the instructor.

HIED 808. Contemporary Issues in Higher Education. 3 Credits.
Lecture and discussion 3 hours; 3 credits. This course is intended to present a broad exploration and generate greater understanding of contemporary issues influencing higher education that will involve discussion, written and oral reports and the integration of knowledge across the spectrum of issues relating to higher education.

HIED 810. Introduction to Student Affairs Administration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: COUN 807. This course is intended to be an introduction to the practice of student affairs work in American Higher Education. It will introduce students to the theoretical foundations of student affairs. It will also provide students with a structural framework for student affairs organization, problems, issues and ideas.

HIED 812. Strategic Planning and Institutional Effectiveness. 3 Credits.
Lecture 3 hours; 3 credits. Strategic Planning and institutional effectiveness is becoming more and more important to institutions as funding sources change and students demand quality. This course will examine how these processes can be carried out on American campuses.

HIED 820. The Private College and University. 3 Credits.
Lecture 3 hours; 3 credits. The U.S. Higher Education system contains great diversity due to the inclusion of private institutions. This course will examine the structure and organization of Higher Education in the U.S., as well as differences and similarities between private and public institutions.

HIED 830. Seminar in Student Affairs Administration. 3 Credits.
Lecture 3 hours; 3 credits. This course provides synthesis, integration, and application of prior coursework; discussion topics include: college students and their environments, student learning and development, administrative issues, ethical decision-making, leadership and staff development, current “hot topics” in student affairs, and counseling and helping skills. A significant portion of the class is spent discussing and actively observing in student affairs areas that are engaged in program development and implementation, environmental needs and assessments, program evaluation, and advising student groups. The final part of the course covers the transition to professional student affairs roles.

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Lecture 3 hours; 3 credits. This course will focus on developing the knowledge, attitude and skills essential to working with individuals seeking assistance with problems that they face while in college. Listening and interviewing skills will be addressed.

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HIED 844. Comparative Higher Education Systems. 1,3 Credit.
Lecture 3 hours; 3 credits. This course presents the development of the three primary systems of higher education in the world today: the U.S., British and European (Confidential) systems. It will also, as appropriate, examine other systems of higher education from around the world.

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Lecture 3 hours; 3 credits. Prerequisites: COUN 707/807, HIED 708/808. This course provides an introduction to the development and management of the curriculum within institutions of higher education.

HIED 862. Development and Fund Raising. 3 Credits.
Lecture 3 hours; 3 credits. The major areas of institutional advancement and fund-raising form the fundamental outline for the course. Students will explore the professional literature and hear lectures from experts in the areas of: institutional marketing, event management, developing a campaign, use of the internet, donor identification and cultivation, planned giving, developing corporate partners, and foundation management.

HIED 863. Case Studies in Higher Education. 3 Credits.
Lecture 3 hours; 3 credits. This course consists of a thorough analysis and dissection of case studies which cover a broad range of higher education administrative areas. For each case, students will examine the facts, including relevant benchmark law; contemporary issues; historical perspective; political realities; institutional mission and culture; ethical considerations; leadership and management approaches; and an analysis of courses of action available to decision-makers.

HIED 864. College and the University Presidency. 3 Credits.
This course is designed to provide greater understanding of the leadership role of college and university presidents and the multiplex of issues associated with the office of the presidency at the various types of American institutions. The course will utilize case study analysis, guest presentation, and review of the literature. There will be rigorous discussion, readings, and analyses in a collegial and reciprocal learning environment.

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An advanced seminar emphasizing the historical, philosophical, and institutional analyses of the development and status of adult and continuing education within the higher education community.

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Lecture 3 hours; 3 credits. This course is a study of the institutional characteristics of the community college, including a review of the history, purpose, students, faculty, administration and organization, finance, and social functions. Considerable attention will be given to current issues facing community colleges. This course is an elective within the master’s program and a required course in the Ph.D. in Community College Leadership.

HIED 868. Internship: Higher Education Administration. 3 Credits.
This internship provides Education Specialist and doctoral students an opportunity to gain practicum experience in mid-level or senior administrative settings in higher education.

HIED 870. External and Internal Relations for Higher Education. 3 Credits.
Lecture, 3 hours. 3 credits. This course serves as an introduction for prospective and current administrators to the social and political context of the higher education environment and its various constituencies. It will teach them to recognize the impact of politics, socioeconomic situations, diversity, media, monetary issues, and equity issues on their leadership practices.

HIED 871. American Higher Education in a Global Context. 3 Credits.
This course is designed to broaden and deepen students’ understanding of contemporary developments in global higher education and to develop analytic skills for understanding the global social, political, and economic processes shaping U.S. higher education in particular. Research and policy literature on current issues in global higher education is used to examine topics including cross-border higher education, student and scholar mobility patterns, the impact of emerging technologies, and transnational research and development partnerships.

HIED 892. Higher Education and Society. 3 Credits.
Lecture 3 hours; 3 credits. A graduate seminar that focuses on the socio-political contexts within which public policy for higher education is developed in the U.S. It examines who makes policy for higher education, how competing policy agendas are negotiated, and what broader forces affect the policy process.

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HIED 894. Organization and Administration of Higher Education in the United States. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Through lectures, visiting presenters, student presentations of literature, and projects and readings, this course is designed to be an introduction/survey of administration, organization and governance of higher education institutions in the United States. In addition to introducing students to the issues, this experience is intended to help students understand the competencies and training necessary to undertake various operational roles in higher education.

HIED 895. Topics in Higher Education Administration. 1-6 Credits.
1-3 credits. Prerequisite: permission of the instructor.

HIED 899. Dissertation. 1-12 Credits.
1-12 credits. Prerequisite: permission of faculty advisor.

HIED 999. Higher Education 999. 1 Credit.
1 credit. A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.
HIST - History

HISTORY Courses

HIST 508. War and American Society in the Twentieth Century. 3 Credits.
This course is an exploration of the content and meaning of wartime experiences within American society between 1898 and 1975. Emphasis is on comparing the levels of national, institutional and personal experiences of war as they affected people at home and in battle, and on considering the relationships between warmaking and social development at particular times.

HIST 509. History of US-Mexico Borderlands. 3 Credits.
The course examines the history of the region straddling the U.S.-Mexico Border from the Spanish Conquest to the present day, focusing on issues of immigration, economic and political integration and the complicated nature of state-building in a transnational environment.

HIST 520. Fascism in Europe. 3 Credits.
This course explores the genesis and development of fascism in Europe between World Wars I and II. Particular emphasis on Fascism in Italy and National Socialism in Germany. Appeal of fascist movements to populations across the socioeconomic spectrum, fluidities of ideology and practice, fascism’s impact on political, economic, social, and cultural life in the interwar period are explored.

HIST 539. Politics and Society in East Asia Since 1945. 3 Credits.
This course explores the political and social developments in Japan, China, and Korea since the end of World War II.

HIST 555. African-American Historiography. 3 Credits.
This course is an examination of the ways historians have addressed specific issues in African-American history.

HIST 556. Research in Local History. 3 Credits.
The course explores the history of Hampton Roads through student use of research materials.

HIST 570. Democracy and Development in Modern Latin America. 3 Credits.
This course analyzes, from a historical perspective, two core problems in Latin America’s modern (since c. 1880) history: political authoritarianism and economic underdevelopment. The temporal and spatial dimensions of change are highlighted in discussions of patron-client political systems, military autonomy and impunity, social movements and revolution, export-oriented economic growth, industrialization, and the roles of national, ethnic and gender identities.

HIST 575. History of Modern Africa. 3 Credits.
The course is designed to enrich students’ understanding of the intersections of political, economic, social and cultural forces that shaped Africa in the last 150 years and continue to affect the lives of peoples throughout the continent. It will focus on a series of major historical transitions that have shaped the development of modern Africa, including the end of the Atlantic slave trade, European imperial conquest and colonial rule, African resistance to European rule, social and cultural transformations, the end of colonial rule and post-colonial challenges.

HIST 595. Topics in History. 1-3 Credits.
The course is an advanced study of selected topics designed for small groups of qualified students to work on subjects of mutual interest which may not be offered regularly. These courses appear in the course schedule, and will be more fully described in information distributed to academic advisors.

HIST 597. Tutorial Work in Special Topics in History. 3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

HIST 598. Tutorial Work in Special Topics in History. 3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

HIST 600. Historical Theory and Practice. 3 Credits.
Lecture 3 hours; 3 credits. Analysis of the development of historical theories, principles and methods and their application to historical research and writing. Required of all graduate students in history.

HIST 602. Studies in American Colonial and Revolutionary History. 3 Credits.
Seminar; 3 credits.

HIST 604. Studies in American History, 1787-1877. 3 Credits.
Seminar; 3 credits.

HIST 608. Studies in American History, 1933 to the Present. 3 Credits.
Seminar; 3 credits.

HIST 612. Studies in the History of the South. 3 Credits.
Seminar; 3 credits.

HIST 616. Studies in American Diplomatic History. 3 Credits.
Seminar; 3 credits.

HIST 618. Studies in American Social History. 3 Credits.
Seminar; 3 credits.

HIST 622. The Atlantic Slave Trade. 3 Credits.
Lecture 3 hours; 3 credits. The course will explore the trans-Atlantic slave trade from its beginnings in the 15th century to its suppression in the 19th century. It will examine the vast body of historical literature on Africa, the Atlantic slave trade and the New World. The course will provide students with a general orientation to the broad context of the Atlantic slave trade. Locating the trade in the context of the expansion of capitalist Europe, students will examine the economic and cultural forces, as well as personal experiences of slavery from Africa, across the Atlantic Ocean, to the Americas. The course will also look at how the trade transformed Africa and how Africa and Africans in turn transformed the Atlantic World.

HIST 625. Studies in African-American History. 3 Credits.
Seminar; 3 credits.

HIST 633. Studies in International History. 3 Credits.
Seminar; 3 credits.

HIST 634. Studies in the History of Military Affairs. 3 Credits.
Seminar; 3 credits.

HIST 637. Studies in War and the Humanities. 3 Credits.
Lecture 3 hours; 3 credits. The impact of war on society, literature and the arts.

HIST 640. Studies in East Asian History. 3 Credits.
Seminar; 3 credits.

HIST 645. Studies in Latin American History. 3 Credits.
Seminar; 3 credits.

HIST 646. Studies in Russian History. 3 Credits.
Lecture 3 hours; 3 credits. Research in Soviet archives in the past decade has enriched and enlarged the study of Stalin’s era (1924-1953). This reading seminar samples new literature on traditional topics, such as Stalin’s rise to power, methods of rule, and foreign policies, as well as scholarship in newly emerging fields. These areas include social history, gender and the family, cinema and popular culture, nationalities, patron-client relations, and the history of science.

HIST 647. Studies in Maritime History. 3 Credits.
Lecture 3 hours; 3 credits. The seminar will explore the major recent developments in maritime historiography. The course will explore how maritime history both presents unique understandings of human history while also working within or redefining broader historical constructs. Students must learn to recognize and analyze historical interpretations and develop, write, and present their own interpretations of primary sources related to a specific topic of local maritime history.

HIST 650. Studies in Ancient History. 3 Credits.
Seminar; 3 credits.

HIST 652. Studies in Medieval History. 3 Credits.
Seminar; 3 credits.
HIST 654. Studies in European History from 1350-1600. 3 Credits.
Seminar; 3 credits.

HIST 656. Studies in European History from 1600-1815. 3 Credits.
Seminar; 3 credits.

HIST 658. Studies in European History from 1815-1914. 3 Credits.
Seminar; 3 credits.

HIST 660. Studies in European History from 1914 to the Present. 3 Credits.
Seminar; 3 credits.

HIST 662. North Atlantic Resources. 3 Credits.
This class will examine how coastal societies around the North Atlantic have developed their use of fish stocks and other marine resources since the late medieval period. Furthermore it will analyze how and why fisheries led to a more or less complete over-fishing of nearly all major species and how international agreements were negotiated to secure a sustainable use of the biological resources of the oceans as common heritage of mankind.

HIST 668. Internships in History. 3 Credits.
Seminar; 3 credits. Minimum of 120 hours. Student works with professionals in areas such as museum management, archives administration, historical editing, historical preservation, electronic records management, archaeology, or oral history. Students will be supervised by a graduate faculty member, who will assign academic reading and written work, such as an historiographic essay, research paper, or final project. Individually arranged.

HIST 675. M.A. Exam Preparation and Research. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of the graduate program director. This advanced seminar integrates the skills needed to pass the M.A. exam in history. Exercises include designing examination reading lists, learning the historiography of the exam fields, preparing for orals, and writing and evaluating a practice exam. This course is not open to students pursuing the thesis option.

HIST 695. Topics in History. 1-3 Credits.
1-3 credits.

HIST 696. Tutorial in Maritime History. 3 Credits.
Individually arranged with appropriate professor and with permission of the graduate program director. Prerequisite: HIST 647.

HIST 697. Tutorials in History. 1-3 Credits.
1-3 credits. Individually arranged with appropriate professor and with the permission of the graduate program director.

HIST 698. Thesis. 3 Credits.
3 credits.

HIST 699. Thesis. 3-9 Credits.
3-9 credits.

HIST 718. Mao's China. 3 Credits.
Lecture 3 hours; 3 credits. This reading seminar will focus on the changes of the Chinese society since the beginning of the 20th century. It will examine the pivotal historical events that led to the Chinese revolution, which put Mao's Communist regime in power and has changed Chinese society ever since. While studying the history chronologically, students will identify issues and factors that affect the Chinese political system and society, and examine the legacies of Mao's revolution from social and individual perspectives. The course will also focus on political formation and transformation of the government, social structure and upheavals, economic reforms, and foreign policies. (cross listed with IS 718/818).

HIST 755. Conflict and Violence in Modern Africa. 3 Credits.
Lecture 3 hours; 3 credits. This course will confront the theme of conflict and violence in Africa since the mid-20th century. It will explore the reasons behind the level of violent conflicts in the continent today, seek to understand their larger significance, and explore ideas for conflict resolution and prevention. (cross listed with IS 755/855).

HIST 795. Selected Topics in International Studies. 1-3 Credits.
3 credits. The advanced historical study of selected topics in international studies.

HIST 999. History 999. 1 Credit.

HLSC - Health Sciences

HEALTH SCIENCES Courses

HLSC 701. Introduction to Health Services. 3 Credits.
HLSC 702. Management in Urban Health Services. 3 Credits.
Lecture 3 hours; 3 credits. This seminar will provide students with an understanding of health care organizations, effective management, and the urban context. Particular attention will be given to the issues of access, cost and quality.

HLSC 709. Multidisciplinary Approach to Health Services Research. 3 Credits.
HLSC 710. Research Design and Application. 3 Credits.
HLSC 712. Qualitative Research Methods. 3 Credits.
HLSC 713. Measurement of Health Phenomena. 3 Credits.
An overview of measurement theory with emphasis on the development, testing, and refinement of norm- and criterion-referenced data collection instruments for health-related research.

HLSC 714. Theory in the Health Sciences. 3 Credits.
HLSC 746. Epidemiology-Advanced. 3 Credits.
Lecture 3 hours; 3 credits. This course examines epidemiology as a method for viewing inborn community health problems and as a body of knowledge derived from this method. Skills in using epidemiology as a method and as knowledge to solve community health problems will be included.

HLSC 764. Health Economics. 3 Credits.
Lecture 3 hours; 3 credits. This course describes the application of economic tools to analyze the operation of markets for health care and insurance. Topics covered include the consumption and costs of health care in the United States, the viewpoints of players in the health care market, and an overview of both supply and demand analysis and cost effectiveness analysis. Complexities of economics unique to health care will be detailed. Further, students will employ these principles in several case studies of current and classic issues in health economics. (Cross-listed with CHP 764).

HLSC 772. Policy and Politics of Health. 3 Credits.
This course enables the student to develop a systematic and analytical framework for understanding health care policy issues. The policy process is covered in detail. Timely policy issues also are discussed.

HLSC 776. International Health. 3 Credits.
Lecture 3 hours; 3 credits. This course will introduce the student to the political, social, cultural and ethical issues involved in disease prevention and health promotion in developing countries. Specific emphasis will be on incidence/prevalence, morbidity/mortality, and identified health problems in specific regions and countries. This course will also identify international health prerogatives aimed at improving health status through education and intervention.

HLSC 795. Topics in Health Sciences. 1-3 Credits.
Lecture, 1-3 hours; 1-3 credits. Designed to provide the advanced student with an opportunity to study independently or in small groups and investigate specific topics of current interest in health services or health sciences.

HLSC 801. Introduction to Health Services. 3 Credits.
Lecture 3 hours; 3 credits. Focuses on the complexities involved in providing health services to populations. Presents issues related to public health, community health, urban and rural health, healthy people/communities and health care delivery in traditional and non-traditional settings.

HLSC 804. Methods of Program Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: HLSC 810 or PAUP 853. Departmental approval required. Examination of various methodologies for designing and conducting public health program evaluation and research. Experimental, quasi-experimental and non-experimental procedures will be covered.

Old Dominion University
HLSC 809. Multidisciplinary Approaches to Health Services Research. 3 Credits.
Lecture 3 hours; 3 credits. Uses theory and research findings from areas such as Biology, Psychology, Sociology, Economics, Urban Studies, and Health Services to achieve an understanding of health services issues and problems. Emphasizes methods of analysis and of developing alternatives related to multidisciplinary perspectives.

HLSC 810. Research Design and Application. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate-level courses in research design and statistics or permission of the instructor. Emphasis is on exploring the advantages/disadvantages and uses of non-experimental, quasi-experimental, and experimental designs in health-related research with application to management, education, and clinical practice. (Cross-listed with PT 810).

HLSC 811. Quantitative Research Methods in Health Care. 3 Credits.
An applied approach to the selection and application of bivariate and multivariate statistical techniques in health services research. Emphasis is placed on handling large data sets and the use of a computer for manipulation of quantitative data.

HLSC 812. Qualitative Research Methods. 3 Credits.
Lecture 3 hours; 3 credits. An exploration of qualitative research methods including participant observation, ethnography and the generation of grounded theory. Individual interviews and focus group methods will be covered and historical, content analysis, phenomenological and montage approaches will also be discussed. Health related examples of published research in a variety of fields will be utilized to exemplify the methods.

HLSC 813. Measurement of Health Phenomena. 3 Credits.
An overview of measurement theory with emphasis on the development, testing, and refinement of norm- and criterion-referenced data collection instruments for health-related research. Prerequisites: graduate-level courses in research design and statistics or permission of the instructor.

HLSC 814. Theory in the Health Sciences. 3 Credits.
Lecture 3 hours; 3 credits. Introduces the philosophy of science by studying the nature and purposes of theory for the health sciences. Standards for evaluation of theories will be described. Selected theories and supporting research from the health services literature will be discussed and critically evaluated.

HLSC 815. Decision Analysis in Health Care. 3 Credits.
Lecture 3 hours; 3 credits. This course teaches students the art and science of decision making. It covers expected utility theory, decision tree analysis, cost-benefit analysis, and the psychological aspects of the decision-making process in the context of health policy research.

HLSC 820. Health Care Delivery System. 3 Credits.
Lecture 3 hours; 3 credits. This course provides the student with an opportunity to analyze the American health care system. The health care system is composed of complex organizational dynamics and structures which predicate the interaction between the major components of the system: personnel who provide service; institutions in which care is provided; financing mechanisms which pay for care; and the government which attempts to regulate it. This course is designed for in-depth analysis and synthesis of all aspects of health care delivery with an emphasis on improving the delivery and access to care.

HLSC 846. Epidemiology-Advanced. 3 Credits.
Lecture 3 hours; 3 credits. This course examines epidemiology as a method for viewing inborn community health problems and as a body of knowledge derived from this method. Skills in using epidemiology as a method and as knowledge to solve community health problems will be included.

HLSC 864. Health Economics. 3 Credits.
Lecture 3 hours; 3 credits. This course describes the application of economic tools to analyze the operation of markets for health care and insurance. Topics covered include the consumption and costs of health care in the United States, the viewpoints of players in the health care market, and an overview of both supply and demand analysis and cost-effectiveness analysis. Complexities of economics unique to health care will be detailed. Further, students will employ these principles in several case studies of current and classic issues in health economics. (Cross-listed with CHP 764).

HLSC 868. Internship in Health Sciences. 3 Credits.
3 credits. Supervised health services field experiences or health sciences laboratory experiences. A completed research project which is publishable or presentable at a professional conference is required to complete the course.

HLSC 872. Policy and Politics of Health. 3 Credits.
This course enables the student to develop a systematic and analytical framework for understanding health care policy issues. The policy process is covered in detail. Timely policy issues are also discussed.

HLSC 873. Development of Grants and Contracts in the Health Professions. 3 Credits.
Lecture 3 hours; 3 credits. Designed as a “hand-on” approach in effective grantmanship, this course will guide the student from the identification of potential funding sources through proposal development. Highlights include program planning, nonprofit status, governmental/foundation corporate trends, local resources and grants administration.

HLSC 875. Comprehensive Health Planning. 3 Credits.
Lecture 3 hours; 3 credits. This course emphasizes the principles and processes of program planning, including a consideration of objectives, priorities, policy choices, assessment of resources, implementation, and evaluation. The student will gain practical experience in program development by developing a planning document.

HLSC 876. International Health. 3 Credits.
Lecture 3 hours; 3 credits. This course will introduce the student to the political, social, cultural and ethical issues involved in disease prevention and health promotion in developing countries. Specific emphasis will be on incidence/prevalence, morbidity/mortality, and identified health problems in specific regions and countries. This course will also identify international health prerogatives aimed at improving health status through education and intervention.

HLSC 881. Dissertation Seminar. 3 Credits.
3 credits. This course will assist students in developing a dissertation proposal. Steps in the research process will be reviewed as students submit drafts of their proposal for faculty and peer review. Problem formulation, integrating theoretical frameworks, preparing for human subjects review and outlining data analysis techniques for hypothesis testing will be discussed. Students will be introduced to University guidelines related to dissertations and other resources to assist them in their task.

HLSC 889. Colloquium I. 1 Credit.
Lecture 1 hour; 1 credit. Grading: Pass/Fail.

HLSC 890. Colloquium II. 1 Credit.
Lecture 1 hour; 1 credit. Grading: Pass/Fail.

HLSC 891. Colloquium III. 1 Credit.
1 credit. This course is the third in a series of colloquial courses in which doctoral level students receive presentations and present research and current topics of interest in health related professions.

HLSC 892. Colloquium IV. 1 Credit.
1 credit. This course is the fourth in a series of colloquial courses in which doctoral level students receive presentations and present research and current topics of interest in health related professions.

HLSC 893. Colloquium V. 1 Credit.
This is the fifth in a series of colloquial courses in which doctoral level students receive presentations and present research and current topics of interest in health related professions.
HLSC 894. Colloquium VI. 1 Credit.
1 credit. This is the sixth in a series of colloquial courses in which doctoral level students receive presentations and present research and current topics of interest in health related professions.

HLSC 895. Topics in Health Sciences. 1-3 Credits.
Prerequisites: Ph.D. standing or permission of the graduate program director. Designed to provide the advanced student with an opportunity to study independently or in small groups and investigate specific topics of current interest in health services.

HLSC 898. Supervised Research. 1-3 Credits.
Supervised research on a specialized topic. Can be repeated.

HLSC 899. Dissertation. 1-12 Credits.
1-12 credits. Available for pass/fail grading only. An approved research project written under the supervision of a faculty advisor, in which the student demonstrates the capacity to design and complete independent applied research. The completed project must be approved by the dissertation committee.

HLSC 999. Health Sciences 999. 1 Credit.
1 credit. A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

HLTH - Health

HEALTH Courses

HLTH 595. Topics in Health. 1-3 Credits.

HLTH 697. Independent Study. 3 Credits.

HMS - Human Movement Sciences

HUMAN MOVEMENT SCIENCES Courses

HMS 601. Adapted Physical Education Design and Supervision. 3 Credits.
Lecture 3 hours; 3 credits. This course is divided into three sections. First section deals with learning how to administer and interpret several evaluation tools. Second section concentrates on developing computer, video taping, and other technology skills for adapted PE. Third section focuses on overall supervision of adapted PE programs in various school and institutional environments.

HMS 605. Principles of Movement Analysis in Team Sports for Physical Education. 3 Credits.
Lecture 3 hours; 3 credits. The course is designed to help teachers and coaches improve their skills in analyzing movement skills in team sports activities. Such skill analysis is necessary to effectively diagnose movement deficiencies, prescribe techniques for improving performance, and modifying activities for the adaptive program.

HMS 606. Planning and Administration of an Effective Health and Physical Education Program. 3 Credits.
Lecture 3 hours; 3 credits. Research in sport pedagogy has revealed that good teachers possess competencies in communication, classroom management, discipline, and organization different from less effective teachers. Students in this course will examine the literature in support of effective teaching behaviors and practice techniques designed to improve classroom communication skills.

HMS 607. Principles of Movement Analysis in Individual Sports for Physical Education. 3 Credits.
Lecture 3 hours; 3 credits. The course is designed to help teachers and coaches improve their skills in analyzing movement skills in individual sports activities. Such skill analysis is necessary to effectively diagnose movement deficiencies, prescribe techniques for improving performance, and modifying activities for the adaptive program.

HMS 609. Principles of Movement Analysis in Dance and Rhythmic Activities for Physical Education. 3 Credits.
Lecture 3 hours; 3 credits. The course is designed to help teachers and coaches improve their skills in analyzing movement skills in dance and rhythmic activities. Such skill analysis is necessary to effectively diagnose movement deficiencies, prescribe techniques for improving performance, and modifying activities for the adaptive program.

HMS 617. Athletic Training - Physical Assessment of the Human Body. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: students must be admitted into graduate athletic training program. The assessment of the bodily functions/ systems as they relate to the care of the athlete. Major areas of concentration include ears, eyes, nose, throat, heart, lungs, g-i tract and urinary tract.

HMS 621. Strength and Conditioning Applications. 3 Credits.
Lecture 3 hours; 3 credits. A study of the principles and techniques utilized in optimizing physical performance and reducing injury through proper and effective strength and conditioning programs. Special emphasis will be placed on current research findings, breakthrough techniques and advanced weight training techniques, and popular conditioning practices.

HMS 622. Contemporary Issues in Athletic Training. 2 Credits.
Lecture 2 hours; 2 credits. Designed to expose the student to current and up to date ideas and techniques in the area of athletic training.

HMS 627. Advanced Orthopaedic Evaluation and Assessment. 1 Credit.
Laboratory 2 hours; 1 credit. Advanced techniques in the assessment of the extremities.

HMS 630. Exercise Physiology. 3 Credits.
3 credits. Prerequisite: EXSC 509 or equivalent. Review of current physiological literature related to muscular exercise including the cardiovascular-respiratory system, metabolic effects of exercise, neuromuscular relationships, and the effects of training or diet, environment, ergogenic aids, temperature, attitude, and other factors on performance and health.

HMS 635. Research Methods in Health, Physical Education, Recreation and Sports. 3 Credits.
3 credits. Types of research, selection of problems, location of research information, collection and classification of data, organization, presentation and interpretation of materials.

HMS 636. Research Problems in Health, Physical Education, Recreation and Sports. 3 Credits.
3 credits. Prerequisite: HMS 635; taken in the last semester of graduate work. Practice in the use of statistical and analytical techniques in solving problems in education; supervised student research.

HMS 642. Clinical Exercise Testing and Prescription. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: HMS 630. Principles of diagnostic exercise assessment, cardiovascular physiology, electrocardiography, ACSM guidelines to exercise testing and prescription for symptomatic and asymptomatic populations.

HMS 643. Athletic Training Practicum III. 1 Credit.
1 credit. Designed to provide practical experience in the athletic training setting and an understanding of evidence-based practice in the sports medicine setting.

HMS 649. Clinical Methods in Athletic Training. 3 Credits.
Lecture 3 hours; 3 credits. Stresses clinical techniques involved in the use of therapeutic modalities, muscle energy, and various rehabilitative concepts.

HMS 661. Seminar in Nutrition for Sports and Health. 3 Credits.
3 credits. This course is an in-depth analysis of the role of nutrition in health and human physical and athletic performance. General areas covered include the role of the six major classes of nutrients in health and sport, physiologic and metabolic interrelationships, malnutrition, nutrition in growing and aging, and diet and nutrition in the prevention of disease.

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HMS 667. Internship in Health, Physical Education, Recreation and Sports. 1-6 Credits.
1-6 credits. Prerequisite: completion of 75% of graduate work. Designed to provide detailed practical experience (400 clock hours) in one of the areas of health education, physical education, recreation and sports. Required of all students entering the administrative emphasis areas without a minimum of one year full-time administrative experience.

HMS 670. Administrative Principles for Recreation, Sport, Health and Physical Education. 3 Credits.
Lecture 3 hours; 3 credits. Director responsibility in recreation, sport, health and physical education; development of an understanding of the administrative and supervisory competencies required of directors in health, physical education, recreation and sport.

HMS 680. Problems in Health Education. 3 Credits.
Lecture 3 hours; 3 credits. Problems in teaching health education on the elementary and secondary level; family life education, substance use and abuse, and mental and emotional health.

HMS 695. Topics in Health, Physical Education, Recreation and Sport. 1-3 Credits.
1-3 credits. Selected topic courses in health and physical education, sport management, and exercise science and wellness.

HMS 697. Independent Study. 1-3 Credits.
1-3 credits. Investigations in health, physical education, recreation, and sport. Problems approved in advance are investigated under the supervision of the faculty advisor.

HMS 698. Thesis. 3-6 Credits.
3-6 credits. Prerequisite: permission of the advisor and committee.

HMS 699. Thesis. 3-6 Credits.
3-6 credits. Prerequisite: permission of the advisor and committee.

HMS 718. Applied Coaching Theory. 3 Credits.
Lecture, 3 hours; 3 credits. This course is designed to give coaches more in-depth coaching knowledge and skills to become more successful in their profession. Emphasis will be placed on understanding the differing coaching strategies and ethical issues in sport, establishing personal philosophies, preparing for job opportunities, designing effective practice and game plans, understanding the different learning levels and styles and observing, analyzing, and critiquing skills. Current research within the students' chosen sports will also be explored.

HMS 719. Organization and Administration in Coaching. 3 Credits.
Lecture, 3 hours; 3 credits. This course is designed to give coaches more in-depth information about the organizational and administrative issues that coaches encounter. Content includes, but is not limited to, safety and injury prevention, contest management matters, field/facility maintenance, budgetary considerations (recruiting, scholarship decisions, fundraising, travel, equipment), public relations and human resource responsibilities (media, parents, administration, assistant coaches, AT, managers, captains), and legal and risk management procedures associated with coaching.

HMS 720. Curriculum Development in Physical Education. 3 Credits.
Lecture 3 hours; 3 credits. A course designed to acquaint the student with the basic principles and practices in curriculum development. Curriculum development methodologies for both K-12 and college curricula will be addressed.

HMS 721. Motivational Issues in Sports. 3 Credits.
Lecture, 3 hours. 3 credits. Motivational and psychological issues relate with sport performance enhancement, athlete/student wellbeing, and clinical issues with specific populations.

HMS 725. Clinical Biomechanics for Rehabilitation Professionals. 3 Credits.
Lecture 3 hours; 3 credits. This course will include advanced theories of biomechanics, pathomechanics, and clinical anatomy relevant to the rehabilitation process of the physically active. Specific rationale will be discussed concerning mechanical properties of musculoskeletal tissues including: structure, function, mechanical properties, healing process, and factors affecting mechanical and healing properties. Participants will examine current and traditional literature from various academic disciplines, including biomechanics, engineering, neuroscience, exercise science, physical education, neurology, and rehabilitation to identify ways this information may be applied to athletic training and related orthopaedic rehabilitation disciplines. Application is stressed as related to the biomechanics, pathomechanics, and functional anatomy for dimensions of movement and athletic performance.

HMS 727. Advanced Biomechanics. 3 Credits.
Study of the relationships among mechanics, energetics and control of human movement. Emphasis will be placed on the application of mechanical concepts in biomechanics research. Prerequisite: EXSC 417W or EXSC 517.

HMS 730. Advanced Cardiovascular Exercise Physiology. 3 Credits.
A study of the physiology and pathophysiology of the cardiovascular system. Effects of exercise on the system will also be discussed. Prerequisite: HMS 630.

HMS 738. Exercise Endocrinology. 3 Credits.
This course will focus on the endocrine responses to acute and chronic exercise and how neuroendocrine function relates to health and athletic performance. Emphasis is placed on the role of the endocrine system in regulating substrate utilization during exercise, energy balance, skeletal muscle plasticity, reproductive function, and the aging process. Prerequisites: EXSC 630.

HMS 739. Current Research in Motor Development. 3 Credits.
Lecture 3 hours; 3 credits. This course will examine the current theories and research relating to qualitative and quantitative changes in motor skills. Attention will be given to structuring learning experiences to maximize development. The perspective will include the entire life span.

HMS 740. Principles and Concepts of Motor Learning. 3 Credits.
Lecture 3 hours; 3 credits. This course will include analysis of motor learning theories and selected factors as they affect the development of motor skills. Practical application and research potential will be included throughout the course to enhance the depth and breadth of motor learning knowledge. The course is designed to teach students the advanced principles and concepts of motor learning so they might apply it to their clinical and research endeavors.

HMS 745. Assessment and Evaluation in Physical Education. 3 Credits.
Lecture 3 hours; 3 credits. This course is designed to acquaint the student with tests and measurement instruments in the fields of health and physical education, test construction, scoring, and methods of interpreting test results. Methodologies for both K-12 and college classes will be included.

HMS 815. Introduction to Doctoral Study Seminar. 3 Credits.
Lecture 3 hours; 3 credits. This course explores current issues and trends in all aspects of human movement science and relates theory to practice.

HMS 816. Research Experience I. 3 Credits.
Lecture 3 hours; 3 credits. Determination of a research project through the review of literature. Course encompasses formulation of a topic along with the design of a research study.

HMS 817. Research Experience II. 3 Credits.
Lecture 3 hours; 3 credits. Supervised research implementation, data collection, and project completion of specific topic within curriculum and instruction or applied kinesiology concepts.
HMS 820. Curriculum Development in Physical Education. 3 Credits.
Lecture 3 hours; 3 credits. A course designed to acquaint the student with the basic principles and practices in curriculum development. Curriculum development methodologies for both K-12 and college curricula will be addressed.

HMS 825. Clinical Biomechanics for Rehabilitation Professionals. 3 Credits.
Lecture 3 hours; 3 credits. This course will include advanced theories of biomechanics, pathomechanics, and clinical anatomy relevant to the rehabilitation process of the physically active. Specific rationale will be discussed concerning mechanical properties of musculoskeletal tissues including: structure, function, mechanical properties, healing process, and factors affecting mechanical and healing properties. Participants will examine current and traditional literature from various academic disciplines, including biomechanics, engineering, neuroscience, exercise science, physical education, neurology, and rehabilitation to identify ways this information may be applied to athletic training and related orthopaedic rehabilitation disciplines. Application is stressed as related to the biomechanics, pathomechanics, and functional anatomy for dimensions of movement and athletic performance.

HMS 827. Advanced Biomechanics. 3 Credits.
Study of the relationships among mechanics, energetics and control of human movement. Emphasis will be placed on the application of mechanical concepts in biomechanics research. Prerequisite: EXSC 417W or EXSC 517.

HMS 830. Advanced Cardiovascular Exercise Physiology. 3 Credits.
A study of the physiology and pathophysiology of the cardiovascular system. Effects of exercise on the system will also be discussed. Prerequisite: HMS 630.

HMS 838. Exercise Endocrinology. 3 Credits.
This course will focus on the endocrine responses to acute and chronic exercise and how neuroendocrine function relates to health and athletic performance. Emphasis is placed on the role of the endocrine system in regulating substrate utilization during exercise, energy balance, skeletal muscle plasticity, reproductive function, and the aging process. Prerequisites: EXSC 630.

HMS 839. Current Research in Motor Development. 3 Credits.
Lecture 3 hours; 3 credits. This course will examine the current theories and research relating to qualitative and quantitative changes in motor skills. Attention will be given to structuring learning experiences to maximize development. The perspective will include the entire life span.

HMS 840. Principles and Concepts of Motor Learning. 3 Credits.
Lecture 3 hours; 3 credits. This course will include analysis of motor learning theories and selected factors as they affect the development of motor skills. Practical application and research potential will be included throughout the course to enhance the depth and breadth of motor learning knowledge. The course is designed to teach students the advanced principles and concepts of motor learning so they might apply it to their clinical and research endeavors.

HMS 845. Assessment and Evaluation in Physical Education. 3 Credits.
Lecture 3 hours; 3 credits. This course is designed to acquaint the student with tests and measurement instruments in the fields of health and physical education, test construction, scoring, and methods of interpreting test results. Methodologies for both K-12 and college classes will be included.

HMS 855. Neuroanatomical Basis of Human Movement. 3 Credits.
Lecture 3 hours; 3 credits. This course will include advanced theories of anatomy, biomechanics, motor control, and movement disorders. It will emphasize neuroanatomical mechanisms that apply to the processes of voluntary movement. The select topics include: basic functional anatomy, physical and chemical foundations of brain and spinal cord, muscle reflexes and spinal connections, muscle contraction mechanics, and sensorimotor system overview.

HMS 890. Doctoral Studies Seminar. 3 Credits.
Students will be introduced to expectations of conducting research, explore concepts associated with becoming a faculty member or practitioner with an earned doctorate, and become familiar with campus resources. Students will learn and apply concepts related to scientific writing. This course will include extensive reading of research articles, grant applications, and other scholarly work. Also, this course will investigate the need for professional development. This will include familiarizing oneself with appropriate professional organizations, exploring the benefits and challenges of collaboration, interviewing and preparing for job placements, and preparing a curricular vitae and teaching philosophy.

HMS 891. Doctoral Research Seminar. 3 Credits.
Students are introduced to the main philosophical traditions of research and scholarship that currently inform scientific inquiry in Human Movement Sciences with a specific focus on the preparation of a research proposal.

HMS 895. Topics. 1-3 Credits.
Lecture 3 hours; 1-3 credits.

HMS 897. Readings and Research in Content Area. 3 Credits.
3 credits. Independent study with a faculty member. A guided review of the literature to determine the history, development, and issues of areas within human movement sciences, curriculum and instruction and applied kinesiology.

HMS 898. Dissertation Research. 1-3 Credits.
1-3 credits. Determination of a research project through the review of literature. Course encompasses formulation of a topic along with the design of a research study.

HMS 899. Dissertation. 1-12 Credits.
1-12 credits. Prerequisite: permission of dissertation committee chair. Work on pre-selected dissertation topic under the direction of dissertation chair.

HMS 999. Exercise Science, Sport, Physical Education and Recreation 999. 1 Credit.
1 credit. A one-credit pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

HMSV - Human Services

HUMAN SERVICES Courses

HMSV 541. Non-Profit Fund-Raising in Human Services. 3 Credits.
This course is designed to expose human service students to the art of ethical fund-raising in human services, including annual and capital campaigns, telemarketing, special events, direct mail marketing, face-to-face solicitation, e-fund-raising, and grant writing.

HMSV 544. Psycho-educational Groups. 3 Credits.
This course combines lectures and experiential learning about psycho-educational groups. Principles and practices for developing and leading psycho-educational groups are emphasized.

HMSV 547. Addictions: Theory and Intervention. 3 Credits.
This course examines the etiology, risk factors and treatment of alcoholism and other addictions. Prerequisites: 12 hours in human services.

HMSV 556. Diversity Experience in Ireland. 3 Credits.
This course is an in-depth, cross-disciplinary study of cultural similarities and differences in approaches to social conflict and other social problems in the United States and in Ireland. A two-week study abroad period will bring students into intensive contact with educators, scholars, and community activists in Ireland. This course will also serve as an introduction to multicultural helping. The influence of socio-identities (e.g. race, ethnicity, religion, gender, socioeconomic status, sexual orientation) on individuals’ functioning, concerns, and the helping process will be explored. Prerequisite: permission of instructor.
HUMANITIES Courses

HUM 595. Topics in Humanities. 1-6 Credits.
The study of selected topics in human services. Prerequisite: permission of the instructor.

HPRO - Health Promotion

HEALTH PROMOTION Courses

HPRO 650. Health Promotion and Education Methods and Materials. 3 Credits.
Lecture 3 hours; 3 credits. This course covers community health methods and strategies at the individual and community levels, teaching/learning styles, learning process, group dynamics, needs assessment, health literacy, adult learning principles, and teaching roles of the health professional. This course is designed to meet the needs of the health professional in the areas of patient instruction, educational programs, and continuing education.

HPRO 660. Program Planning and Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. This course examines the application of evaluation skills for community health programs. The course is designed to assist students in identifying and gaining proficiency in the skills of designing, organizing, coordinating, and evaluating health education programs.

HPRO 670. Cultural Issues in Health Promotion and Education. 3 Credits.
Lecture 3 hours; 3 credits. This course provides an introduction for multicultural communication for health promotion and disease management. The topics include how to work collaboratively in diverse groups with an understanding of health behaviors, values, and health benefits.

HUM - Humanities

HUMANITIES Courses

HUM 595. Topics in Humanities. 1-3 Credits.
1-3 credits. Advanced study of selected topics designed for small groups of qualified students to work on subjects of mutual interest which may not be offered regularly. These courses will appear in the course schedule and will be more fully described in information distributed to academic advisors.

HUM 597. Tutorial Work in Humanities. 1-3 Credits.
1-3 credits. Independent reading and study on a topic selected under the direction of an instructor.

HUM 601. Introduction to the Humanities. 3 Credits.
Lecture, 3 hours. 3 credits. This class introduces students to the study of the humanities with a focus on the enduring questions and ideas of human history. These include questions of culture, reality, society, power, truth, communication, and mediation. Students address these questions and ideas by engaging with some of the great works of social theory from the twentieth century.

HUM 602. Theory and Methods in Humanities. 3 Credits.
Lecture 3 hours; 3 credits. This class instructs students in various theoretical and methodological approaches for conducting research within the humanitarian disciplines. Students will become familiar with literary theory, critical/cultural studies, historical methods, qualitative social scientific approaches, and visual studies, as well as the conduct of research across disciplinary boundaries.

HUM 630. The Information Society. 3 Credits.
Lecture 3 hours; 3 credits. This course explores the theories, questions, claims and myths that have accompanied the rise of new communication technologies and electronically derived digital information that define the “Electronic Revolution,” also known as the Information Society. (cross-listed with COMM 630).

HUM 640. Television and Politics. 3 Credits.
Lecture 3 hours; 3 credits. This class closely examines television’s role in shaping and reflecting contemporary American political culture, the conduct of foreign policy, and formal political processes, such as elections. (cross-listed with COMM 640).

HUM 657. Introduction to American Popular Culture. 3 Credits.
Lecture 3 hours; 3 credits. This course introduces students to the history and diversity of popular culture forms, industries, criticism, and debates in the United States. The course is interdisciplinary, with a focus on the relationship of cultural hierarchy to social and national identity.

HUM 668. Internship. 3 Credits.
3 credits. This course allows graduate students in Humanities to pursue a structured work experience in a field relevant to a student’s course of study. Student will work with a supervisor at the work site and a faculty advisor in Humanities. Requirements include a formal essay connected to the experience, portfolio, and satisfactory evaluation by the supervisor. Permission of Humanities director required. Pass/fail grading only.

HUM 694. Interdisciplinarity and the Humanities: Theory and Practice. 3 Credits.
Lecture/seminar 3 hours; 3 credits. Prerequisites: HUM 601, 602. The capstone seminar for non-thesis humanities students. The seminar provides a forum in which to discuss contemporary theories and questions concerning interdisciplinary humanities research. Students will also develop and complete a research paper which reflects their own interdisciplinary programs of study.

HUM 696. Special Topics in Humanities. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor. Appropriate advanced study of small groups on special topics selected under the direction of an instructor. Conferences and papers as appropriate.

HUM 697. Tutorial Work in Humanities. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor. Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

HUM 698. Thesis. 3 Credits.
3 credits. Prerequisites: HUM 601 and 602.

HUM 699. Thesis. 3,6 Credits.
3 or 6 credits. Course requirement for thesis option.

HUM 797. Tutorial Work in the Humanities. 1-3 Credits.
1-3 credits. Independent reading and study under the direction of an instructor on a topic to be selected.

HUM 897. Tutorial Work in the Humanities. 1-3 Credits.
1-3 credits. Independent reading and study under the direction of an instructor on a topic to be selected.

HUM 998. Thesis. 3 Credits.
HUM 999. Humanities 999. 1 Credit.

HPE - Health Physical Education

HEALTH PHYSICAL EDUCATION Courses

HPE 506. Tests and Measurement in Physical Education and Health. 3 Credits.
This course is designed to acquaint the student with tests and measurement in the fields of health and physical education, test construction, scoring, and methods of using results.

HPE 530. Teaching Wellness and Health-Related Fitness. 3 Credits.
The study of techniques for the teaching of wellness and health-related fitness. Content to be covered includes drug education, nutrition, wellness, mental health, and various aspects of fitness training appropriate for the teaching of PreK-12 physical education and health.

HPE 587. Teacher Candidate Seminar. 1 Credit.
Prerequisites: acceptance into teacher education and approval of the program advisor. Study and group discussion of problems growing out of the student teaching (teacher candidate internship) experience. Students must pass Praxis II to complete this course.

HPE 597. Topics in Health and Physical Education. 1-3 Credits.
HPE 598. Topics in Health and Physical Education. 1-3 Credits.
HPE 698. Thesis. 3 Credits.
HPE 699. Thesis. 3 Credits.
IDT - Instructional Design/Technol
INSTRUCTIONAL DESIGN/TECHNOL Courses

IDT 575. Web Development for Educators. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Provides both a conceptual framework and hands-on experience in the design and development of online web resources for educators. The course introduces the student to the various uses and features of online tools and technologies, investigates online learning strategies, and explores best practices in the use of the web to enhance learning. Topics include fundamentals of web authoring: screen design, use of web page creation tools, and functional use of HTML and derivatives.

IDT 617. Foundations of Instructional Technology. 3 Credits.
Lecture 3 hours; 3 credits. Required introductory overview to the field of instructional technology. Topics include a history of the field, basic instructional design, generally accepted theoretical practices and major formats of instructional media. Emphasis is given to instructional technology trends as applied to various industries, including K-12, military, industry training, and others.

IDT 715. Management of Technology Resources in the Classroom. 3 Credits.
Lecture. 3 hours. 3 credits. Surveys computing technology with a focus on management in educational contexts. Implementation, integration and resourcing will be covered.

IDT 725. Human Performance Assessment. 3 Credits.
Lecture. 3 hours. 3 credits. Prerequisite: FOUN 722 or equivalent. This course focuses on the theory, design, and evaluation of measurement instruments used to assess individual knowledge, performance, and attitudes. Topics include fundamentals of measurement, reliability, validity, and instrument selection, construction, and use. Students will develop and evaluate instruments for instructional and research purposes.

IDT 730. Principals and Practice of Human Performance Technology. 3 Credits.
Lecture. 3 hours. 3 credits. This course explores both the principles and practices of human performance technology, with roughly equal emphasis on both. Students will learn what HPT is, how it’s applied in practice, and how and why instructional designers need to know about it. Particular emphasis is given to determining whether or not problems are best amenable to instructional solutions.

IDT 735. Knowledge Management. 3 Credits.
Lecture. 3 hours. 3 credits. This seminar focuses on what knowledge management is and how and why knowledge management is relevant for instructional designers. Emphasis is placed on theoretical approaches to knowledge management, though we will touch upon the design of knowledge management systems.

IDT 737. Consulting Skills for Instructional Designers. 3 Credits.
Lecture. 3 hours. 3 credits. This project-based course is designed to develop and enhance the ability of instructional designers to work as partners and consultants to clients and superiors. The focus is on consulting skills per se, and not any particular content. All students will be required to do an individual consulting project, supervised by the instructor.

IDT 739. Needs Analysis and Assessment. 3 Credits.
Lecture. 3 hours; 3 credits. This project-based class will focus on the process of doing a needs analysis and assessment, from start to finish. Although theoretical considerations regarding needs analyses will be explored, the emphasis is on actually conducting the analysis. Students will work in teams under the supervision of the instructor to conduct a needs analysis for an external client.

IDT 742. Task Analysis Methods. 3 Credits.
Lecture; 3 hours; 3 credits. This project-based course examines several different task analysis methodologies. Major methodologies common in the field will be explored as a class, and students will also be required to familiarize themselves with other methodologies of their choice. Emphasis will be on practical application of the methodologies, especially as regards instructional products or systems.

IDT 746. Foundations of Distance Education. 3 Credits.
Lecture 3 hours; 3 credits. An analysis of the trends, issues, and theories of distance education in education, business, and military applications. Students will examine various distance education systems, policies and lessons from different perspectives.

IDT 748. Instructional Technology Product Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: IDT 749/849. Provides an overview to the science of evaluation, both as a general field and as applied to instruction. Topics will include evaluating the effectiveness of learning technologies; building survey instruments; online and computer-assisted testing; reporting practices; as well as formative, summative program and performance evaluation and assessment. The unique demands of evaluating mediated education and learning environments will be considered.

IDT 749. Instructional Systems Design. 3 Credits.
Lecture 3 hours; 3 credits. Students will gain hands-on experience applying a theoretical understanding of instructional design and development to actual projects. Students will learn and use the Instructional Systems Design Process from initial learner profile analysis to design and development through to evaluation. Students will work individually and in teams to gain experience similar to real-world instructional design situations. Students will master the fundamental practices upon which the instructional design process is based.

IDT 751. Computer-Based Multi-Media Design. 3 Credits.
Lecture. 3 hours. 3 credits. Prerequisite: IDT 749/849. This course covers the theory, design, and evaluation of computer-based multimedia instruction. Students will demonstrate a thorough understanding of instructional theory and design strategies for computer-based drills, tutorials, hypermedia, simulations, games, tools, open-ended learning environments, tests, and web-based instruction. Class projects will center on the design and development of instruction utilizing at least two of these methodologies.

IDT 755. Theory and Design of Instructional Simulation. 3 Credits.
Lecture. 3 hours; 3 credits. Prerequisite: IDT 749/849. This course covers the theory, design, and evaluation of instructional simulation. The course will explore why and how instructional designers need to know about instructional simulation. Special emphasis will be on theoretical and practical instruction design processes as applied to various industries, including K-12, military, industry training, and others.

IDT 756. Instructional Gaming: Theories and Practice. 3 Credits.
Lecture. 3 hours; 3 credits. This course focuses on learning theory, design and evaluation of instructional gaming. The course will explore the science of instructional gaming, both as a general field and as applied to instructional gaming. Topics will include evaluating the effectiveness of learning technologies; building survey instruments; online and computer-assisted testing; reporting practices; as well as formative, summative program and performance evaluation and assessment. The unique demands of evaluating mediated education and learning environments will be considered.

IDT 757. Instructional Systems Design. 3 Credits.
Lecture. 3 hours; 3 credits. Students will gain hands-on experience applying a theoretical understanding of instructional design and development to actual projects. Students will learn and use the Instructional Systems Design Process from initial learner profile analysis to design and development through to evaluation. Students will work individually and in teams to gain experience similar to real-world instructional design situations. Students will master the fundamental practices upon which the instructional design process is based.

IDT 758. Instructional Technology Product Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: IDT 749/849. Provides an overview to the science of evaluation, both as a general field and as applied to instruction. Topics will include evaluating the effectiveness of learning technologies; building survey instruments; online and computer-assisted testing; reporting practices; as well as formative, summative program and performance evaluation and assessment. The unique demands of evaluating mediated education and learning environments will be considered.

IDT 759. Needs Analysis and Assessment. 3 Credits.
Lecture. 3 hours; 3 credits. This project-based course is designed to develop and enhance the ability of instructional designers to work as partners and consultants to clients and superiors. The focus is on consulting skills per se, and not any particular content. All students will be required to do an individual consulting project, supervised by the instructor.

IDT 760. Cognition and Instructional Design. 3 Credits.
Lecture 3 hours; 3 credits. Students will be introduced to the theoretical frameworks that form the basis of instructional systems theory and design. Focus will be on learning theories, instructional psychology, and instructional system theory. Recent developments in cognition, learning and instruction for educators will also be considered. Topics include perspectives of behaviorism, social-historical constructivism, cognitive science, situated cognition, and cultural influences on cognition.
IDT 761. Applied Instructional Design. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: IDT 749/849. Problem-based course in which students gain experience applying knowledge from IDT 749/849 to real-world instructional and instructional technology problems. Project work is individual, paired, and in teams. Students demonstrate mastery of the instructional design and development process through production of tools, technologies, media or materials that successfully resolve an instructional problem. Focus is on rapid prototyping model.

IDT 763. Instructional Design Theory. 3 Credits.
Lecture 3 hours; 3 credits. Students will investigate traditional and contemporary instructional design theories and models. Behavioral, cognitive, generative, problem-based learning, and constructivist theories as well as cognitive hierarchies will be examined, compared, contrasted and applied to various instructional situations.

IDT 764. Theories and Research. 3 Credits.
Lecture 3 hours, 3 credits. This course is a study of the application of perceptual and learning principles to the design of instructional media for use in educational and training applications. The focus is on the development and application of heuristics from the research literature. We will examine verbal and iconic signs as well as visual imagery, and their role in the instructional and learning processes.

IDT 773. Advanced Instructional Design Techniques. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: IDT 749/849. Exploration and application of techniques, tools and competencies characteristic of expert designers. Topics may include: instructional strategies, use of design software, program design, advanced analysis techniques, motivation design, rapid prototyping, reducing design cycle time, and designing instruction for diverse learner populations.

IDT 775. Designing Online Instruction. 3 Credits.
Lecture, 3 hours. 3 credits. An applied survey of online instruction, including relevant theory and design considerations. Topics include efficacy of online learning, design considerations when using course management systems and similar online learning technologies, research and future directions.

IDT 795. Topics in Instructional Design and Technology. 3 Credits.
1-3 credits. Provides opportunities for master’s and doctoral students to explore topics related to instructional design.

IDT 801. Instructional Design and Technology Seminar. 3 Credits.
Lecture 3 hours; 3 credits. Introduces new Ph.D. students to the field of instructional design and technology and provides orientation to doctoral level study. The course includes reading, critiquing and analyzing empirical research, theories, and real-world instructional problems. Potential student research agendas consistent with faculty or programmatic research foci will be explored. Academic and technological expectations will be communicated and practiced.

IDT 810. Trends and Issues in Instructional Design and Technology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: 9 hours IDT coursework. Exploration and discussion of trends and issues of current and historical significance to instructional design. Readings will include contributions of key scholars, past and present, in instructional design and related fields. Includes analysis of trends and issues to track and predict their impact on the future of the field.

IDT 815. Management of Technology Resources in the Classroom. 3 Credits.
Lecture, 3 hours. 3 credits. Surveys computing technology with a focus on management in educational contexts. Implementation, integration and resourcing will be covered.

IDT 825. Human Performance Assessment. 3 Credits.
Lecture, 3 hours. 3 credits. Prerequisite: FOUN 722 or equivalent. This course focuses on the theory, design, and evaluation of measurement instruments used to assess individual knowledge, performance, and attitudes. Topics include fundamentals of measurement, reliability, validity, and instrument selection, construction, and use. Students will develop and evaluate instruments for instructional and research purposes.

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Lecture 3 hours. 3 credits. This course explores both the principles and practices of human performance technology, with roughly equal emphasis on both. Students will learn what HPT is, how it’s applied in practice, and how and why instructional designers need to know about it. Particular emphasis is given to determining whether or not problems are best amenable to instructional solutions.

IDT 835. Knowledge Management. 3 Credits.
Lecture, 3 hours. 3 Credits. This seminar focuses on what knowledge management is and how and why knowledge management is relevant for instructional designers. Emphasis is placed on theoretical approaches to knowledge management, though we will touch upon the design of knowledge management systems.

IDT 837. Consulting Skills for Instructional Designers. 3 Credits.
Lecture, 3 hours. 3 credits. This project-based course is designed to develop and enhance the ability of instructional designers to work as partners and consultants to clients and superiors. The focus is on consulting skills per se, and not any particular content. All students will be required to do an individual consulting project, supervised by the instructor.

IDT 839. Needs Analysis and Assessment. 3 Credits.
Lecture, 3 hours; 3 credits. This project-based class will focus on the process of doing a needs analysis and assessment, from start to finish. Although theoretical considerations regarding needs analyses will be explored, the emphasis is on actually conducting the analysis. Students will work in teams under the supervision of the instructor to conduct a needs analysis for an external client.

IDT 842. Task Analysis Methods. 3 Credits.
Lecture, 3 hours; 3 credits. This project-based course examines several different task analysis methodologies. Major methodologies common in the field will be explored as a class, and students will also be required to familiarize themselves with other methodologies of their choice. Emphasis will be on practical application of the methodologies, especially as regards instructional products or systems.

IDT 846. Foundations of Distance Education. 3 Credits.
Lecture 3 hours; 3 credits. An analysis of the trends, issues, and theories of distance education in education, business, and military applications. Students will examine various distance education systems, policies and lessons from different perspectives.

IDT 848. Instructional Technology Product Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: IDT 749/849. Provides an overview to the science of evaluation, both as a general field and as applied to instruction. Topics will include evaluating the effectiveness of learning technologies; building survey instruments; online and computer-assisted testing; reporting practices; as well as formative, summative program and performance evaluation and assessment. The unique demands of evaluating mediated education and learning environments will be considered.

IDT 849. Instructional Systems Design. 3 Credits.
Lecture 3 hours; 3 credits. Students will gain hands-on experience applying a theoretical understanding of instructional design and development to actual projects. Students will learn and use the Instructional Systems Design Process from initial learner profile analysis to design and development through to evaluation. Students will work individually and in teams to gain experience similar to real-world instructional design situations. Students will master the fundamental practices upon which the instructional design process is based.

IDT 851. Computer-Based Multi-Media Design. 3 Credits.
Lecture, 3 hours. 3 credits. Prerequisite: IDT 749/849. This course covers the theory, design, and evaluation of computer-based multimedia instruction. Students will demonstrate a thorough understanding of instructional theory and design strategies for computer-based drills, tutorials, hypermedia, simulations, games, tools, open-ended learning environments, tests, and web-based instruction. Class projects will center on the design and development of instruction utilizing at least two of these methodologies.
IDT 852. Diffusion and Adoption of Instructional Technology Innovations. 3 Credits.
Lecture 3 hours; 3 credits. This course will explore theories, research, and strategies related to the diffusion and adoption of instructional technology innovations in education and training. The course will explore why and how individuals, groups, and organizations adopt or fail to adopt an innovation or change.

IDT 855. Theory and Design of Instructional Simulation. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on learning theory, design and evaluation of instructional simulations and simulators. Topics include history, instructional design, validation, and integration of instructional simulations.

IDT 856. Instructional Gaming: Theories and Practice. 3 Credits.
Lecture 3 hours; 3 credits. Provides both a conceptual framework and experience in the design and development of instructional games. The course introduces the student to the history, research, theory, and practice of instructional games. Topics include discussions of relevant learning theories associated with instructional gaming, analysis and design of games and current research in instructional gaming.

IDT 860. Cognition and Instructional Design. 3 Credits.
Lecture 3 hours; 3 credits. Students will be introduced to the theoretical frameworks that form the basis of instructional systems theory and design. Focus will be on learning theories, instructional psychology, and instructional system theory. Recent developments in cognition, learning and instruction for educators will also be considered. Topics include perspectives of behaviorism, social-historical constructivism, cognitive science, situated cognition, and cultural influences on cognition.

IDT 861. Applied Instructional Design. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: IDT 749/849. Problem-based course in which students gain experience applying knowledge from IDT 749/849 to real-world instructional and instructional technology problems. Project work is individual, paired, and in teams. Students demonstrate mastery of the instructional design and development process through production of tools, technologies, media or materials that successfully resolve an instructional problem. Focus is on rapid prototyping model.

IDT 863. Instructional Design Theory. 3 Credits.
Lecture 3 hours; 3 credits. Students will investigate traditional and contemporary instructional design theories and models. Behavioral, cognitive, generative, problem-based learning, and constructivist theories as well as cognitive hierarchies will be examined, compared, contrasted and applied to various instructional situations.

IDT 864. Theories and Research. 3 Credits.
Lecture 3 hours, 3 credits. This course is a study of the application of perceptual and learning principles to the design of instructional media for use in educational and training applications. The focus is on the development and application of heuristics from the research literature. We will examine verbal and iconic signs as well as visual imagery, and their role in the instructional and learning processes.

IDT 873. Advanced Instructional Design Techniques. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: IDT 749/849. Exploration and application of techniques, tools and competencies characteristic of expert designers. Topics may include: instructional strategies, use of design software, program design, advanced analysis techniques, motivation design, rapid prototyping, reducing design cycle time, and designing instruction for diverse learner populations.

IDT 875. Designing Online Instruction. 3 Credits.
Lecture, 3 hours. 3 credits. An applied survey of online instruction, including relevant theory and design considerations. Topics include efficacy of online learning, design considerations when using course management systems and similar online learning technologies, research and future directions.

IDT 879. Research Residency in Instructional Design and Technology. 3 Credits.
An introduction to conducting instructional technology research. Students will work in consultation with their advisor to develop a proposal for a study related to instructional technology as part of their research residency that will be submitted for presentation at a nationally refereed conference or to a refereed journal.

IDT 895. Topics in Instructional Design and Technology. 3 Credits.
1-3 credits. Provides opportunities for master’s and doctoral students to explore topics related to instructional design.

INBU - International Business

INTERNATIONAL BUSINESS Courses

INBU 630. Fundamentals of International Business. 1 Credit.
This course covers topics from management, marketing, economics, and finance that are important to the study of international business.

INBU 631. International Business Issues. 2 Credits.
This 2 hour capstone course covers topics facing international firms. This course uses a combination of case studies, lectures, and simulations to highlight the cultural, organizational, and financial challenges to doing business in various regions of the world.

IS - International Studies

INTERNATIONAL STUDIES Courses

IS 600. Research Methods in International Studies. 3 Credits.
Lecture 3 hours; 3 credits. Interdisciplinary quantitative techniques applicable to the study of international phenomena.

IS 601. Seminar in International Relations Theory. 3 Credits.
Lecture 3 hours; 3 credits. Surveys major theoretical approaches to international relations and foreign policy. A systematic introduction designed to lay a foundation for advanced graduate study.

IS 606. American Foreign Policy and World Order. 3 Credits.
This course deals with the adaptation of US foreign policies to the changing structure of the international system after WWII and in the Cold War, and since Reagan. It is designed to review, analyze, and discuss the global rise of the US role in the world. It will also assess the transformation of US interests since 1945, through the Cold War and since the events of September 11, 2001.

IS 620. Advanced Statistical Techniques for International Studies. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: IS 600. Multivariate regression, causal analysis, and advanced statistical applications.

IS 655. International History. 3 Credits.
Course explores how different societies in the 20th century were shaped by similar practices, ideas, and pressures. Course themes may include colonialism, the global history of World War II, the cold war ethnic distortion and the consumer revolution among others.

IS 668. Internship in International Studies. 1-6 Credits.
3 credits. Prerequisite: approval of the director. Individually arranged internship at local, state, national or international level.

IS 695. Topics in International Studies. 3 Credits.
Lecture 3 hours; 3 credits. The advanced study of selected (titled) topics not offered on a regular basis.

IS 696. Seminar Topics in International Studies. 3 Credits.
3 credits. The advanced study of selected topics in an interdisciplinary manner which permits small groups of qualified students to work on subjects of mutual interest. Due to their specialized nature, seminar topics may not be offered regularly.

IS 697. Independent Research in International Studies. 3 Credits.
Independent research on a topic from an interdisciplinary perspective. Students must receive prior approval from the faculty supervisor and the director.
IS 698. Directed Research. 3 Credits.
Methodological and theoretical preparation designed to assist students in writing a thesis. Prerequisites: approval of director or instructor.

IS 699. Thesis. 1-9 Credits.
1-9 credits. Writing of the thesis.

IS 701. Global Change and American Foreign Policy. 3 Credits.
Seminar, 3 hours. 3 credits. This research seminar examines the transformation of the U.S. role in the world in the global context of the 20th Century and since September 2001.

IS 702. Approaches to Collective Security. 3 Credits.
Lecture 3 hours; 3 credits. This seminar explores the origins of the idea of collective security, examines the attempts to organize international security collectively and assesses possibilities and opportunities for collective security arrangements after the Cold War.

IS 703. Ethics and International Relations. 3 Credits.
Lecture 3 hours; 3 credits. The focus of this research seminar will be on the role of normative ideas in international relations. Students will be introduced to the growing literature on normative approaches to international relations as well as the traditional literature on the practical and philosophical problems of ethical action in the relations of states. Although a number of policy applications will be considered, the primary focus will be on the theoretical incorporation of normative ideas into our understanding of state action in the anarchic international environment.

IS 704. Latin American Politics. 3 Credits.
Seminar 3 hours; 3 credits. This course examines Latin American politics from comparative and historical perspectives. Particular focus is placed on various manifestations of political authority in the region and the major societal challenges to state power. The course reviews and critiques alternative theoretical approaches to the study of state-societal relations in Latin America.

IS 705. The Euro-Atlantic Community. 3 Credits.
Seminar 3 hours; 3 credits. An examination of the Euro-Atlantic area as a partial international system since World War II: alignments and patterns within and between the members of the European "community" and the role and attitudes of the United States and leading European states to preserve and strengthen their sovereign prerogatives and influence; and the prospects for a true Euro-Atlantic community that would link the U.S. and Europe.

IS 706. The Causes of War. 3 Credits.
Lecture 3 hours; 3 credits. This research seminar will explore the theoretical and empirical literature on the causes of violent conflict between states.

IS 707. Interdependence, Power, and Transnationalism. 3 Credits.
Seminar 3 hours; 3 credits. This course covers the fundamental concepts, ideas, and approaches to the study of interdependence and transnationalism. It seeks to expose students to the nature, role, and impact of economic, technological, strategic, and cultural interdependence. Cases of interdependence and transnationalism are explored in the post-Cold War era. Some focus is placed on how interdependence and transnationalism are impacting the power of the state.

IS 709. Chinese Foreign Policy. 3 Credits.
Seminar 3 hours; 3 credits. This seminar includes an advanced survey of theoretical approaches to the study of Chinese foreign policy and in-depth analyses of the domestic/international environment, ideological principles, political/economic goals, military/diplomatic instruments, decision-making processes, and global/regional consequences of Chinese foreign policy.

IS 710. Global Environmental Policy. 3 Credits.
Lecture 3 hours; 3 credits. This seminar examines the institutions and political actors involved in global environmental policy making with emphasis on the role of the United States. In doing so, it addresses the scientific and political debate concerning the causes, consequences, and proposed solutions of selected worldwide ecological problems, including global climate change, stratospheric ozone depletion, acid rain, and loss of biodiversity among others.

IS 711. International Migration and Refugee Movement. 3 Credits.
Seminar 3 hours; 3 credits. A review of current literature and empirical issues concerning transnational migration and refugees.

IS 712. The New Germany in the New Europe. 3 Credits.
Seminar 3 hours; 3 credits. The unification of Germany and the end of the East-West conflict have changed the context within which policy is made in Europe. What kind of Europe will emerge? What kind of hierarchies will determine direction and pace of European politics? The purpose of this course is to explore the role played by Germany in the development of post-Cold War European politics.

IS 713. Global Political Economy. 3 Credits.
Seminar 3 hours; 3 credits. Analysis of the forces shaping national and transnational economic institutions and their policies on a range of contemporary issues, including North-South relations.

IS 714. Law in the International System. 3 Credits.
Lecture 3 hours; 3 credits. An introduction to the principles of international law and to the political and institutional role of law in the relations of states.

IS 715. France and New Europe. 3 Credits.
Seminar 3 hours; 3 credits. Emphasis will be placed on the transformation of French-American relations from the idyllic beginnings of the American nation to the complexities of the Cold War, to the new alignments of the new Europe and the European Union.

IS 716. Theories of Comparative Sociopolitical Studies. 3 Credits.
Lecture 3 hours; 3 credits. The fundamental goal of the course is to provide the theoretical basis for subsequent coursework and research in the comparative and regional studies track. To achieve this goal, this seminar examines major theories and debates in comparative social and political studies based on extensive and intensive literature review.

IS 717. World Population and Development. 3 Credits.
Seminar 3 hours; 3 credits. This seminar discusses population processes and their connections to socioeconomic development. A nontechnical course, the goal is to introduce students to the major concerns and issues in population and current debates over the role of population in sustainable development. It will provide students with a systematic but critical review of research findings and issues in various areas of population and development.

IS 718. Mao's China. 3 Credits.
Lecture 3 hours; 3 credits. This reading seminar will focus on the changes of the Chinese society since the beginning of the 20th century. It will examine the pivotal historical events that led to the Chinese revolution, which put Mao’s Communist regime in power and has changed the Chinese society ever since. While studying the history chronologically, students will identify issues and factors that affect the Chinese political system and society, and examine the legacies of Mao’s revolution from social and individual perspectives. The course will also focus on political formation and transformation of the government, social structure and upheavals, economic reforms, and foreign policies. (cross listed with HIST 718).

IS 719. Chinese Politics. 3 Credits.
Lecture 3 hours; 3 credits. This seminar focuses on post-Mao China. It examines the fundamental rules, prominent players, and major issues in contemporary Chinese politics. The course reviews and critiques alternative theoretical approaches to the study of Chinese politics.

IS 720. Research Seminar in Global Security. 3 Credits.
Seminar 3 hours; 3 credits. The research seminar investigates the profound changes in international security brought about by the end of the Cold War with a specific focus on the role of nuclear weapons. The primary purpose of the seminar is to promote research into the global aspects of the nuclear issue and to enhance understanding of the relationship between nuclear control and the New World Order.

IS 721. New World Order: Chaos and Coherence. 3 Credits.
Seminar 3 hours; 3 credits. The end of the Cold War has ushered tremendous political changes and an equally broad intellectual debate on the meaning of these changes. What will be the basic rules of international politics? Will the future resemble the past or follow new rules of its own? What countries, what groups, and what issues will dominate the future of world politics?.

IS 722. Law in the International System. 3 Credits.
Lecture 3 hours; 3 credits. An introduction to the principles of international law and to the political and institutional role of law in the relations of states.

IS 715. France and New Europe. 3 Credits.
Seminar 3 hours; 3 credits. Emphasis will be placed on the transformation of French-American relations from the idyllic beginnings of the American nation to the complexities of the Cold War, to the new alignments of the new Europe and the European Union.

IS 716. Theories of Comparative Sociopolitical Studies. 3 Credits.
Lecture 3 hours; 3 credits. The fundamental goal of the course is to provide the theoretical basis for subsequent coursework and research in the comparative and regional studies track. To achieve this goal, this seminar examines major theories and debates in comparative social and political studies based on extensive and intensive literature review.

IS 717. World Population and Development. 3 Credits.
Seminar 3 hours; 3 credits. This seminar discusses population processes and their connections to socioeconomic development. A nontechnical course, the goal is to introduce students to the major concerns and issues in population and current debates over the role of population in sustainable development. It will provide students with a systematic but critical review of research findings and issues in various areas of population and development.

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IS 720. Research Seminar in Global Security. 3 Credits.
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IS 721. New World Order: Chaos and Coherence. 3 Credits.
Seminar 3 hours; 3 credits. The end of the Cold War has ushered tremendous political changes and an equally broad intellectual debate on the meaning of these changes. What will be the basic rules of international politics? Will the future resemble the past or follow new rules of its own? What countries, what groups, and what issues will dominate the future of world politics?.

IS 722. Law in the International System. 3 Credits.
Lecture 3 hours; 3 credits. An introduction to the principles of international law and to the political and institutional role of law in the relations of states.
IS 722. Democracy and International Relations. 3 Credits. Lecture 3 hours; 3 credits. An examination of the relationship between democratic politics, democratic ideals, and international relations. Subjects covered will include trends and processes of democratization and their implications for international relations, the distinctiveness of democratic states in their international behavior, the impact of the international environment on the internal politics of democratic states, and the problems of democracy in global governance.

IS 725. Politics of the Middle East. 3 Credits. Lecture 3 hours; 3 credits. Explores the international relations of the Middle East from World War I to the present. Examines the origins of the Arab-Israeli and Persian Gulf Wars and their modern dimensions. Examines the role of oil, outside powers and religion.

IS 730. The Rise and Fall of the Socialist Bloc. 3 Credits. Lecture 3 hours; 3 credits. This reading seminar will feature occasional lectures and extensive discussion about topics such as the consolidation of Soviet power in East Europe, the road to the Cold War, socialist economic practices, Soviet ‘imperialism’ within the bloc, Soviet support for ‘national-liberation’ movements in Asia and Africa, the building of the wall, the Sino-Soviet alliance, the events of 1989, and post-socialist nostalgia.

IS 732. National Identity in a Global Age. 3 Credits. Lecture; 3 hours; 3 credits. This course will focus on narratives of national identity in the age of globalization. Seminal works of cultural criticism, philosophy, and political philosophy will shed light on the complex nature of national identity construction in the contemporary world.

IS 740. Political Economy of Development. 3 Credits. This seminar examines alternate theoretical perspectives on development. These perspectives are then employed to understand contemporary political and economic changes in the developing world, including the consolidation of democratic governance and the liberalization of domestic economics.

IS 741. Globalization and Social Change in the World System. 3 Credits. Seminar 3 hours; 3 credits. This course is intended to first identify the distinguishing characteristics of globalization. It then attempts to examine its implications on a number of critical issues, including the future of democracy, income distribution and ethnic, class, and gender relations.

IS 742. Contested Territories. 3 Credits. Lecture 3 hours; 3 credits. Using case studies of Europe since 1918, this course examines the contours of territorial disputes. The ways in which territorial contests are presented and represented through the lenses of geopolitics, ethnicity and race, nationalism, gender, violence, international authority and diplomatic and institutional influence will be explored.

IS 745. Social Movements and Revolution in Latin American History. 3 Credits. Lecture 3 hours; 3 credits. Interpretations of the three major social revolutions in modern Latin America (Mexico 1910, Cuba 1959 and Nicaragua 1979) and of a variety of social movements (agrarian, labor, urban, religious and so on) are studied from a continental perspective. The relevant theoretical literature and the economic, cultural and political background receive special attention. A broad knowledge of modern Latin American history is assumed.

IS 748. Gender and Globalization. 3 Credits. Lecture, 3 hours. 3 credits. Studies systems of global restructuring as they impact women throughout the globe. Migration, international development, and transnational activism will be focal themes, explored across a variety of national contexts.

IS 751. Ethnic Conflict in the Emerging Global Order. 3 Credits. Lecture 3 hours; 3 credits. Using different case studies, this course investigates the most important internal and external factors that cause ethnic conflicts. It also examines different mechanisms that help resolve or mitigate such conflicts.

IS 752. Research Seminar in International Studies: Refugees. 3 Credits. Seminar 3 hours; 3 credits. This is a graduate-level seminar focusing on the refugee movement from a global perspective. The goals are to provide a critical and realistic understanding of the refugee phenomenon and to explain why the refugees tend to follow some identifiable paths, and why they sometimes return and sometimes do not. Discussion will be centered on the causes and consequences of refugee flow, and the roles the more developed countries can play in helping solve the problem.

IS 755. Conflict and Violence in Modern Africa. 3 Credits. Lecture 3 hours; 3 credits. This course will confront the theme of conflict and violence in Africa since the mid-20th century. It will explore the reasons behind the level of violent conflicts in the continent today, seek to understand their larger significance, and explore ideas for conflict resolution and prevention. (Cross listed with HIST 755).

IS 760. International Cultural Studies: History, Theory and Application. 3 Credits. 3 Cr. Course analyzes culture in the context of material conditions in which it is produced, disseminated, controlled and practiced. Theoretical application of cultural studies will include developing familiarity with key foundational theories, terminologies, and critical thinking.

IS 762. Game Theory. 3 Credits. Lecture 3 hours, 3 credits. Game theory uses mathematical models, empirical investigation, and simulations in an effort to explain simple and complex strategic interactions among individuals, states, groups, and species. This course teaches the tools of game theory, with a focus on applications in international relations and political science.

IS 765. Agent-Based Modeling and Simulation for International Studies. 3 Credits. Lecture 3 hours, 3 credits. An introduction to complex systems theory and to the application of agent-based modeling technologies to a variety of social systems.

IS 770. Transnational Media Practices. 3 Credits. Lecture, 3 hours. 3 credits. Course examines the key roles played by media technologies in implementing and promoting international development programs, as well as some of the concerns these initiatives have raised in terms of media literacy, cultural sovereignty, and information access.

IS 794. Seminar in Thesis and Dissertation Preparation. 3 Credits. 3 credits. Prerequisite: permission of the director. Prepares students to research, formulate and write thesis and dissertation prospectuses.

IS 795. Topics in International Studies. 1-3 Credits. 1-3 credits. The advanced study and discussion of selected (titled) topics not offered on a regular basis.

IS 796. Selected Topics in International Studies. 1-3 Credits. 1-3 credits. The advanced study of selected topics in an interdisciplinary manner which will permit small groups of qualified students to work on subjects of mutual interest. Due to their specialized nature, the course may not be offered regularly.

IS 801. Global Change and American Foreign Policy. 3 Credits. Seminar, 3 hours. 3 credits. This research seminar examines the transformation of the U.S. role in the world in the global context of the 20th Century and since September 2001.

IS 802. Approaches to Collective Security. 3 Credits. Lecture 3 hours; 3 credits. This seminar explores the origins of the idea of collective security, examines the attempts to organize international security collectively and assesses possibilities and opportunities for collective security arrangements after the Cold War.
IS 803. Ethics and International Relations. 3 Credits.
Lecture 3 hours; 3 credits. The focus of this research seminar will be on the role of normative ideas in international relations. Students will be introduced to the growing literature on normative approaches to international relations as well as the traditional literature on the practical and philosophical problems of ethical action in the relations of states. Although a number of policy applications will be considered, the primary focus will be on the theoretical incorporation of normative ideas into our understanding of state action in the anarchic international environment.

IS 804. Latin American Politics. 3 Credits.
Seminar 3 hours; 3 credits. This course examines Latin American politics from comparative and historical perspectives. Particular focus is placed on various manifestations of political authority in the region and the major societal challenges to state power. The course reviews and critiques alternative theoretical approaches to the study of state-societal relations in Latin America.

IS 805. The Euro-Atlantic Community. 3 Credits.
Seminar 3 hours; 3 credits. An examination of the Euro-Atlantic area as a partial international system since World War II; alignments and patterns within and between the members of the European “community” and the role and attitudes of the United States and leading European states to preserve and strengthen their sovereign prerogatives and influence; and the prospects for a true Euro-Atlantic community that would link the U.S. and Europe.

IS 806. The Causes of War. 3 Credits.
Lecture 3 hours; 3 credits. This research seminar will explore the theoretical and empirical literature on the causes of violent conflict between states.

IS 807. Interdependence, Power, and Transnationalism. 3 Credits.
Seminar 3 hours; 3 credits. This course covers the fundamental concepts, ideas, and approaches to the study of interdependence and transnationalism. It seeks to expose students to the nature, role, and impact of economic, technological, strategic, and cultural interdependence. Cases of interdependence and transnationalism are explored in the post-Cold War era. Some focus is placed on how interdependence and transnationalism are impacting the power of the state.

IS 809. Chinese Foreign Policy. 3 Credits.
Seminar 3 hours; 3 credits. This seminar includes an advanced survey of theoretical approaches to the study of Chinese foreign policy and in-depth analyses of the domestic/international environment, ideological principles, political/economic goals, military/diplomatic instruments, decision-making processes, and global/regional consequences of Chinese foreign policy.

IS 810. Global Environmental Policy. 3 Credits.
Lecture 3 hours; 3 credits. This seminar examines the institutions and political actors involved in global environmental policy making with emphasis on the role of the United States. In doing so, it addresses the scientific and political debate concerning the causes, consequences, and proposed solutions of selected worldwide ecological problems, including global climate change, stratospheric ozone depletion, acid rain, and loss of biodiversity among others.

IS 811. International Migration and Refugee Movement. 3 Credits.
Seminar 3 hours; 3 credits. A review of current literature and empirical issues concerning transnational migration and refugees.

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Seminar 3 hours; 3 credits. The unification of Germany and the end of the East-West conflict have changed the context within which policy is made in Europe. What kind of Europe will emerge? What kind of hierarchies will determine direction and pace of European politics? The purpose of this course is to explore the role played by Germany in the development of post-Cold War European politics.

IS 813. Global Political Economy. 3 Credits.
Seminar 3 hours; 3 credits. Analysis of the forces shaping national and transnational economic institutions and their policies on a range of contemporary issues, including North-South relations.

IS 814. Law in the International System. 3 Credits.
Lecture 3 hours; 3 credits. An introduction to the principles of international law and to the political and institutional role of law in the relations of states.

IS 815. France and New Europe. 3 Credits.
Seminar 3 hours; 3 credits. Emphasis will be placed on the transformation of French-American relations from the idyllic beginnings of the American nation to the complexities of the Cold War, to the new alignments of the new Europe and the European Union.

IS 816. Theories of Comparative Sociopolitical Studies. 3 Credits.
Lecture 3 hours; 3 credits. The fundamental goal of the course is to provide the theoretical basis for subsequent coursework and research in the comparative and regional studies track. To achieve this goal, this seminar examines major theories and debates in comparative social and political studies based on extensive and intensive literature review.

IS 817. World Population and Development. 3 Credits.
Seminar 3 hours; 3 credits. This seminar discusses population processes and their connections to socioeconomic development. A non-technical course, the goal is to introduce students to the major concerns and issues in population and current debates over the role of population in sustainable development. It will provide students with a systematic but critical review of research findings and issues in various areas of population and development.

IS 818. Mao’s China. 3 Credits.
Lecture 3 hours; 3 credits. This seminar focuses on post-Mao China. It examines the fundamental rules, prominent players, and major issues in contemporary Chinese politics. The course reviews and critiques alternative theoretical approaches to the study of Chinese politics.

IS 820. Research Seminar in Global Security. 3 Credits.
Seminar 3 hours; 3 credits. The research seminar investigates the profound changes in international security brought about by the end of the Cold War with a specific focus on the role of nuclear weapons. The primary purpose of the seminar is to promote research into the global aspects of the nuclear issue and to enhance understanding of the relationship between nuclear control and the New World Order.

IS 821. New World Order: Chaos and Coherence. 3 Credits.
Seminar 3 hours; 3 credits. The end of the Cold War has ushered tremendous political changes and an equally broad intellectual debate on the meaning of these changes. What will be the basic rules of international politics? Will the future resemble the past or follow new rules of its own? What countries, what groups, and what issues will dominate the future of world politics?

IS 822. Democracy and International Relations. 3 Credits.
Lecture 3 hours; 3 credits. An examination of the relationship between democratic politics, democratic ideals, and international relations. Subjects covered will include trends and processes of democratization and their implications for international relations, the distinctiveness of democratic states in their international behavior, the impact of the international environment on the internal politics of democratic states, and the problems of democracy in global governance.

IS 825. Politics of the Middle East. 3 Credits.
Lecture 3 hours; 3 credits. Explores the international relations of the Middle East from World War I to the present. Examines the origins of the Arab-Israeli and Persian Gulf Wars and their modern dimensions. Examines the role of oil, outside powers and religion.
IS 830. The Rise and Fall of the Socialist Bloc. 3 Credits.
Lecture 3 hours; 3 credits. This reading seminar will feature occasional lectures and extensive discussion about topics such as the consolidation of Soviet power in East Europe, the road to the Cold War, socialist economic practices, Soviet ‘imperialism’ within the bloc, Soviet support for ‘national-liberation’ movements in Asia and Africa, the building of the wall, the Sino-Soviet alliance, the events of 1989, and post-socialist nostalgia.

IS 832. National Identity in a Global Age. 3 Credits.
Lecture, 3 hours; 3 credits. This course will focus on narratives of national identity in the age of globalization. Seminal works of cultural criticism, philosophy, and political philosophy will shed light on the complex nature of national identity construction in the contemporary world.

IS 840. Political Economy of Development. 3 Credits.
This seminar examines alternate theoretical perspectives on development. These perspectives are then employed to understand contemporary political and economic changes in the developing world, including the consolidation of democratic governance and the liberalization of domestic economics.

IS 841. Globalization and Social Change in the World System. 3 Credits.
Seminar 3 hours; 3 credits. This course is intended to first identify the distinguishing characteristics of globalization. It then attempts to examine its implications on a number of critical issues, including the future of democracy, income distribution and ethnic, class, and gender relations.

IS 842. Contested Territories. 3 Credits.
Lecture 3 hours; 3 credits. Using case studies of Europe since 1918, this course examines the contours of territorial disputes. The ways in which territorial contests are presented and represented through the lenses of geopolitics, ethnicity and race, nationalism, gender, violence, international authority and diplomatic and institutional influence will be explored.

IS 845. Social Movements and Revolution in Latin American History. 3 Credits.
Lecture 3 hours; 3 credits. Interpretations of the three major social revolutions in modern Latin America (Mexico 1910, Cuba 1959 and Nicaragua 1979) and of a variety of social movements (agrarian, labor, urban, religious and so on) are studied from a continental perspective. The relevant theoretical literature and the economic, cultural and political background receive special attention. A broad knowledge of modern Latin American history is assumed.

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Lecture, 3 hours; 3 credits. Studies systems of global restructuring as they impact women throughout the globe. Migration, international development, and transnational activism will be focal themes, explored across a variety of national contexts.

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Lecture 3 hours; 3 credits. Using different case studies, this course investigates the most important internal and external factors that cause ethnic conflicts. It also examines different mechanisms that help resolve or mitigate such conflicts.

IS 852. Research Seminar in International Studies: Refugees. 3 Credits.
Seminar 3 hours; 3 credits. This is a graduate-level seminar focusing on the refugee movement from a global perspective. The goals are to provide a critical and realistic understanding of the refugee phenomenon and to explain why the refugees tend to follow some identifiable paths, and why they sometimes return and sometimes do not. Discussion will be centered on the causes and consequences of refugee flow, and the roles the more developed countries can play in helping solve the problem.

IS 855. Conflict and Violence in Modern Africa. 3 Credits.
Lecture 3 hours; 3 credits. This course will confront the theme of conflict and violence in Africa since the mid-20th century. It will explore the reasons behind the level of violent conflicts in the continent today, seek to understand their larger significance, and explore ideas for conflict resolution and prevention. (cross listed with HIST 755).

IS 860. International Cultural Studies: History, Theory and Application. 3 Credits.
3 Cr. Course analyzes culture in the context of material conditions in which it is produced, disseminated, controlled and practiced. Theoretical application of cultural studies will include developing familiarity with key foundational theories, terminologies, and critical thinking.

IS 862. Game Theory. 3 Credits.
Lecture 3 hours; 3 credits. Game theory uses mathematical models, empirical investigation, and simulations in an effort to explain simple and complex strategic interactions among individuals, states, groups, and species. This course teaches the tools of game theory, with a focus on applications in international relations and political science.

IS 865. Agent-Based Modeling and Simulation for International Studies. 3 Credits.
Lecture 3 hours; 3 credits. An introduction to complex systems theory and to the application of agent-based modeling technologies to a variety of social systems.

IS 868. Internship in International Studies. 1-6 Credits.
1-6 credits. Prerequisite: approval of director. Internship individually arranged at local, state, or international level.

IS 870. Transnational Media Practices. 3 Credits.
Lecture, 3 hours; 3 credits. Course examines the key roles played by media technologies in implementing and promoting international development programs, as well as some of the concerns these initiatives have raised in terms of media literacy, cultural sovereignty, and information access.

IS 894. Seminar in Thesis and Dissertation Preparation. 3 Credits.
3 credits. Prerequisite: permission of the director. Prepares students to research, formulate and write thesis and dissertation prospectuses.

IS 895. Topics in International Studies. 1-3 Credits.
1-3 credits. The advanced study and discussion of selected (titled) topics not offered on a regular basis.

IS 896. Selected Topics in International Studies. 1-3 Credits.
1-3 credits. The advanced study of selected topics in an interdisciplinary manner which will permit small groups of qualified students to work on subjects of mutual interest. Due to their specialized nature, the course may not be offered regularly.

IS 897. Independent Research in International Studies. 3 Credits.
1-9 credits. Prerequisite: approval of the director. Independent research directed by professors.

IS 898. Directed Research. 1-9 Credits.
1-9 credits. Prerequisite: approval of director or instructor. Methodological and theoretical preparation designed to assist students in writing a dissertation.

IS 899. Dissertation. 1-9 Credits.
1-9 credits. May be repeated up to 18 credits.

IS 999. International Studies 999. 1 Credit.
1 credit. A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

IT - Information Technology

INFORMATION TECHNOLOGY Courses

IT 530. Object-Oriented Programming with JAVA. 3 Credits.
Lecture and discussion 3 hours; 3 credits. An introduction to JAVA as an object-oriented language used to write JAVA applets and applications. Business examples incorporating multimedia, multithreading, networking, and advanced graphical interfaces are used to reinforce the object-oriented concepts of abstraction, encapsulation, inheritance, polymorphism, persistence, and dynamic binding.

IT 595. Topics. 1-3 Credits.
IT 610. Information Technology Management. 3 Credits.
Lecture 3 hours; 3 credits. Information is a critical resource for today’s organizations. This course prepares students for the managerial, organizational and technological challenges involved on managing information and information technology resources.

IT 612. Knowledge Management. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisites: IT 610 or equivalent; This course covers theory and practice of managing knowledge in organizations. Knowledge processes including knowledge creation, acquisition, transfer and application are studied. Students are introduced to real-world technologies and systems.

IT 620. Systems Analysis and Design. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: IT 610 or equivalent; or permission of the department. Introduction to the Systems Development Life Cycle (SDLC) from an information systems project perspective. Emphasis is placed on the planning and analysis functions performed during information systems project work. Tools and techniques include: Data flow diagrams, Entity relationship diagrams, Computer-aided systems engineering (CASE), and the Project repository. These tools will be employed to create process and data-driven versions of these models.

IT 624. Information Technology Assurance Services. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: ACCT 601 or equivalent. Standards, ethics, and practice of information technology assurance services particularly as it concerns the governance and control of information systems. (cross listed with ACCT 624).

IT 625. Information Systems for International Business. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: IT 610 or equivalent; or permission of the department. Examines the role of information in the global environment and the global organization. Issues related to information infrastructures for the organization, nation and the world will be covered, as well as how global information systems departments support the organization.

IT 635. Telecommunication and E-Commerce. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: IT 620 or equivalent; or permission of the department. Examines the impact of electronic commerce and telecommunications in the global business environment. A comprehensive introduction to the use of the Internet to effectively exploit the Internet’s resources for business applications.

IT 649. Information Systems and Network Security. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: IT 635 or permission of the department. Introduces the fundamental issues and concepts of information security, emphasizing security policy, risk management, cryptography and network security.

IT 650. Database Management Systems. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: IT 620 or equivalent; or permission of the department. Introduction to database management systems. The topics addressed include system architecture, data models, database analysis, design and implementation, query processing, business transaction processing, and database security.

IT 651. Data Warehousing and Mining. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: IT 650 or permission of the department. Introduction to data warehousing and mining. Examines techniques used to extract data patterns and relationships from various operational and historical data.

IT 652. On-Line Analytical Processing (OLAP). 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: IT 650 or permission of the department. Introduction to On-Line Analytical Processing and the use of multidimensional techniques and tools to extract information from data warehouses and marts.

IT 653. Database Administration Fundamentals. 3 Credits.
Lecture, 3 hours. 3 credits. Prerequisite: IT 650. Overview of database administration of major database platforms such as Oracle and DB2. Topics include database installation and configuration, performance monitoring and tuning, storage management, database security, user management, database connectivity, and backup/recovery techniques.

IT 654. Advanced Database Administration. 3 Credits.
Lecture, 3 hours. 3 credits. Prerequisite: IT 650. Overview of advanced database administration techniques of state-of-the-art database platforms. Topics include grid infrastructure, database clouds, RAC.

IT 655. Database Programming for the Web. 3 Credits.
Lecture, 3 hours. 3 credits. Prerequisite: IT 650. In-depth exploration of web-based database administration and implementation. Hands-on experience with a variety of web-based database technologies. Topics include: MySQL, PHP, XML database technologies such as XQuery, XPath, and XML schemas, web log analysis, and text mining.

IT 660. Enterprise Information Systems. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: IT 650. This course covers the organizational design and implementation of enterprise information systems based on large ERP software packages. Software engineering issues specific to packaged software such as software customization, upgrade, localization, extension and integration are explored. Students are exposed to real-world technologies and systems.

IT 661. Implementing Internet Applications. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisites: IT 610 or equivalent; prior programming experience; or permission of the department. Advanced design and implementation strategies are utilized to create dynamic e-commerce applications. Key concepts include: Internet architecture, structured data languages, scripting languages, programming languages, database connectivity, and Internet security.

IT 664. Project Management in Information Technology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: IT 620 or equivalent, or permission of the department. This course provides basic knowledge of project management including tools to manage scope, time, cost, quality, risk, team, communications and procurement. Special issues in the IT context are emphasized.

IT 665. Network Systems Administration. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: IT 635 or permission of the department. Covers the essential knowledge and skills required to administer networks. Hands-on experience with commercial software. Topics include architecture, planning, installation, configuration, resource sharing, and network optimization.

IT 667. Cooperative Education. 1-3 Credits.
1-3 credits. Prerequisite: IT 620 or equivalent. Approval for enrollment and allowable credits are determined by the department and Career Management in the semester prior to enrollment.

IT 668. Information Systems Internship. 1-3 Credits.
1-3 credits. Prerequisite: IT 620 or equivalent. Approval for enrollment and allowable credits are determined by the department and Career Management in the semester prior to enrollment. Available for pass/fail grading only.

IT 672. Information Architectures. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: IT 650 or permission of the department. Modeling of information architectures for business. High-level modeling methodologies. Implications for database and object data management.

IT 674. Managing IT Strategically. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: IT 620 or equivalent, or permission of the department. Focuses on improving business use of existing IT and managing for competitive advantage. Prepares IT students for executive positions in IT including CIO. Non-IT students benefit by gaining a strategic perspective on an important organizational resource – information.
IT 680. Computing Aspects of Medical Informatics. 3 Credits. Lecture, 3 hours; 3 credits. Overview of computing aspects of medical informatics. Computational methods in scientific computing of medical informatics are covered. The basic thrust is to demonstrate the usefulness and power of computational methods in solving real-life problems in perspectives of medical informatics.

IT 685. Introduction to Information Security. 3 Credits. Lecture, 3 hours. 3 credits. Prerequisite: IT 610. Introduction to technical and administrative aspects of information security. Topics include identification and authentication, access control, security models, computer intrusion detection, trust management, cryptography, PKI, firewalls, network security, web security, and secure e-commerce and e-business.

IT 695. Selected Topics in Information. 1-3 Credits. 3 credits. Prerequisite: permission of the department chair and the graduate program director.

IT 697. Independent Study in Information Systems. 1-3 Credits. 1-3 credits. Prerequisite: IT 650 or permission of the department. Affords students the opportunity to undertake independent study under the direction of a faculty member.

IT 698. Master’s Project in Information. 3 Credits. 3 credits. Prerequisites: IT 650 and permission of the department.

IT 699. Master’s Thesis in Information Systems. 1-6 Credits. 1-6 credits. Prerequisites: IT 650 and permission of the department.

IT 795. Selected Topics in Management Information Systems. 1-3 Credits. 3 credits. Prerequisite: permission of the department chair and the graduate program director.

IT 800. Theoretical Foundations in ISR. 3 Credits. Lecture 3 hours; 3 credits. A survey of research methodology in business information technology research including empirical, behavioral and computational approaches in different types of problem domains. The approach will be interdisciplinary.

IT 850. Enterprise Architecture. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: IT 800. This course examines the latest advances in enterprise architecture and computing. Topics include enterprise architecture design and modeling, service-oriented architecture (SOA), and integration of enterprise information and applications.

IT 890. Seminar in Business Process and Enterprise Systems. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: IT 800. This course discusses how firms achieve business excellence through business process management (BPM), business process improvement (BPI), and business process reengineering (BPR) supported by IT. Topics include business process and workflow modeling, analysis, integration, monitoring and management.

IT 891. Seminar in Business Intelligence. 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: IT 800. The objective of this course is to provide an overview of managerial and technical issues associated with business intelligence. Topics covered include the state-of-the art data warehousing, data mining and OLAP technologies.

IT 892. Seminar in Knowledge Management. 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: IT 800. The course examines the latest advances in knowledge management (KM) including identifying, capturing, sharing and evaluating an enterprise’s knowledge assets. The course reviews and discusses existing technologies in KM and new emerging KM technologies and practices.

IT 893. Seminar in Supply Chain in E-Business. 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: IT 800. This course examines the development of information technologies related to supply chain management in a global e-business environment. Topics include managing material flow processes, maritime, logistics, procurement, inventory and distribution. (cross-listed with MSCM 893).

IT 895. Selected Topics in Management Information Systems. 1-3 Credits. 3 credits. Prerequisite: permission of the department chair and the graduate program director.

IT 899. Dissertation. 1-12 Credits. 3 hours; 1-12 credits. Departmental approval required. Prerequisite: IT 893. PhD level research and writing of dissertation.

LIBS - Library Science

LIBRARY SCIENCE Courses

LIBS 602. Production of Instructional Materials. 3 Credits. Develops skills in preparing, evaluating, and presenting instructional materials and the use of those materials to promote higher level thinking and to enhance the teaching learning environment. Includes logistics and safety concerns of a production facility, and development of in-service activities. Hands-on practice in producing television programs and using computer software to produce instructional materials.

LIBS 605. Selection and Utilization of Non-Book Media. 3 Credits. Prerequisites: LIBS 675. Emphasizes selection, purchase and utilization of non-book materials (e.g., periodicals, computers, CD-ROM, DVD, LANs, wireless networks, PDAs, e-books, retrieval systems, video conferencing, DL, online services, telecommunications, presentation systems). Included are staff development, systems management, information policies, networks, and the impact of professional associations on non-book resources.

LIBS 642. Children’s Literature Across the Curriculum, PK-8. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Students examine, evaluate, discuss, and use literature and related nonprint materials for children and young adolescents and explore strategies for using trade books across the curriculum and for introducing children to literature. Materials for adolescents and adults with limited reading abilities are also covered.

LIBS 669. Practicum in School Libraries. 3-9 Credits. Course can be repeated 1 time. Students will work in a school library, participating fully in the administrative tasks, collaborate with teachers to prepare instructional literacy lessons, and teach lessons. Course is for students who are already licensed teachers or who are seeking initial licensure. Prerequisites: LIBS 602, LIBS 605, LIBS 675, LIBS 676, LIBS 678, and LIBS 679.

LIBS 675. Administration, Management, and Evaluation of Libraries. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Entry-level course dealing with the planning, organization, and management of the school library media center. Includes professionalism and ethics in librarianship, facilities planning to impact student learning, and management of human resources.

LIBS 676. Library Media Services and the Curriculum. 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: graduate standing and LIBS 675. Emphasis is on library services/ programs and the curriculum of the school. Includes techniques for curriculum design and development, information skills instruction, instructional partnerships, advocacy, implementation of an integrated library-media instructional program and public relations programs.

LIBS 677. Technical Services in Libraries. 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: graduate standing and LIBS 675. Describes the fundamentals of description, cataloging, processing, organizing, and accessing of materials. This includes on-line circulation systems, descriptive cataloging using AACR2R and MARC, Dewey Decimal Classification, and Sears Subject Headings. Also discusses bibliographic networks and utilities in technical services and the relationship of technical services procedures to the overall mission of the SLMC.
MAE - Mechanical/Aerospace Engr

MECHANICAL/AEROSPACE ENGR Courses

MAE 503. Flight Mechanics. 3 Credits.
Aircraft concepts including performance prediction and optimization, flight and maneuver envelopes, and steady flight performance. Additional topics: longitudinal static stability and trim; aircraft dynamics; development, separation and solution of aircraft equations of motion; natural modes; dynamic stability; sensors and actuators; and design of stability augmentation and autopilot systems. Prerequisites: MAE 406, MAE 436.

MAE 504. Vibrations. 3 Credits.
Free and forced vibrations of undamped and damped, single-degree of freedom, multi-degree of freedom, and continuous systems. Exact and approximate methods to find natural frequencies.

MAE 506. Flight Vehicle Aerodynamics. 3 Credits.
Inviscid flow concepts including: Euler equations, stream function, velocity potential, singularities, vorticity and circulation laws. Viscous flow topics including boundary layers separation, and turbulent flow. In addition, external flows, lift and drag, thin airfoil theory, finite wing theory and airfoil design will be discussed.

MAE 507. Ground Vehicle Aerodynamics. 3 Credits.
Review of basic fluid mechanics of the incompressible flow of air. Introduction to bluff body aerodynamics, production and performance (race car) automotive aerodynamics, as well as truck and bus aerodynamics. Discussion of experimental and computational methods for evaluating vehicle aerodynamic performance. Optimization of high performance vehicle design for low drag and/or high downforce and the facilities and techniques required. Introduction to the aerodynamics of other surface vehicles such as sailboats and trains. Lecture and wind tunnel experiments.

MAE 511. Mechanical Engineering Power Systems Theory and Design. 3 Credits.
Thermodynamic properties of gases and vapors relating to power generating devices, work-energy relations, combustion, and heat exchangers. Performance analyses and design concepts of gas turbines, internal combustion engines, steam power plants and heat exchanger equipment from theoretical and applied viewpoints.

MAE 512. Environmental Control. 3 Credits.
Engineering principles as applied to the analysis and design of systems for automatically controlling man or machine environments. Course encompasses fundamentals of heating, ventilating, air conditioning, refrigeration, cryogenics, and design of building energy systems.

MAE 513. Energy Conversion. 3 Credits.
Introduction of relevant kinetic theory, solid state, and thermodynamic principles; operation and analysis of thermoelectric, photovoltaic, thermionic, magnetohydrodynamic devices, fuel cell, isotopic, and solar power generators. Course seeks to define engineering limits of converter efficiency and other performance criteria.

MAE 514. Introduction to Gas Dynamics. 3 Credits.
One-dimensional compressible flow considering isotropic flow, normal shocks, flow in constant area ducts with friction, flow in ducts with heating and cooling, oblique shocks, Prandtl-Meyer expansions, shock-expansion theory, flow around diamond shaped airfoils, and wind tunnel mechanics.

MAE 516. Introduction to Solar Energy Engineering. 3 Credits.
Prerequisites: MAE 315. Basic solar radiation processes, engineering analysis of solar collectors, energy storage methods, system design and simulation, applications to heating, cooling, and power generation.

MAE 517. Propulsion Systems. 3 Credits.
Basic principles of design, operation and performance of propulsion systems - including turbojet, turboprop, turbofan, and ramjet engines. Introduction to chemical rockets, ion and plasma thrusters.

MAE 520. Aerospace Structures. 3 Credits.
Analysis of aircraft and space vehicle structural components. Effects of bending, torsion and shear on typical aerospace structural components, statically indeterminate beams, shear center and shear flow. Introduction to typical aerospace structures. Introduction to composite structures.

MAE 531. Mechanisms Analysis and Design. 3 Credits.
Basic relations necessary for analysis of plane motion mechanisms, numerical and analytical solutions for some of the basic mechanisms, methods of calculating rolling and sliding velocities and accelerations of contacting bodies, cams, and gears.

MAE 538. Applied Analog and Digital Control. 3 Credits.
Computer-aided analysis and design of practical control systems. Introduction to state-space, digital signal processing and digital control. Laboratory sessions on aliasing, analog, system identification, and real-time control.

MAE 540. Introduction to Finite Element Analysis. 3 Credits.
Basic concepts of finite-element method, method of weighted residuals, interpolation functions, numerical implementation of finite-element method, applications to engineering problems such as beam deflection, heat conduction, and plane elastic problems.

MAE 550. Principles of Naval Architecture. 3 Credits.
Basic principles of naval architecture related to ship geometry, stability, strength, resistance, propulsion, vibration and motions in waves and controllability.

MAE 555. Motorsports Vehicle Dynamics. 3 Credits.
Basic mechanics governing vehicle dynamic performance. Analytical methods in vehicle dynamics. Laboratory consists of various vehicle dynamics tests on model vehicles and full-size racecars.

MAE 557. Motorsports Vehicle Dynamics. 3 Credits.
Introduction to spacecraft systems starting from mission design and space environment considerations and proceeding through propulsion, altitude control, spacecraft structural design, thermal control, power and communications for spacecraft.

MAE 557. Racecar Performance. 3 Credits.
Prerequisites: MAE 407 or MAE 507 and MAE 457 or MAE 557. On-track performance of typical racecars (Legends and Baby Grand) to demonstrate and evaluate the interplay between vehicle aerodynamics, suspension system geometry adjustments, tire selection and operating pressure on overall racecar performance and handling. Laboratory testing via on-board instrumentation during skid pad and road course evaluation; computer simulation to investigate various car set-ups.
MAE 572. Statistical Foundations for Experimenters, 3 Credits.
Introduction to applied statistics for engineers and experimenters. Descriptive statistics for data analysis, introduction to probability, frequency distributions and sampling. Hypothesis testing and confidence intervals of one and two sample problems. ANOVA, one-factor experimental designs, fixed and random effects, multiple comparisons, correlation and regression analysis, control charts. Application to aerospace testing.

MAE 577. High Performance Piston Engines, 3 Credits.
A study of the fundamental principles and performance characteristics of spark ignition and diesel internal combustion engines. Overview of engine types and their operation, engine design and operating parameters; ideal and semi-empirical models of engine cycles; combustion, fluid flow and thermal considerations in engine design and performance. Laboratory evaluation of engine performance using flow and dynamometer systems.

MAE 595. Topics in Mechanical and Aerospace Engineering, 1-3 Credits.
Special topics of interest with emphasis placed on recent developments in mechanical and aerospace engineering or engineering mechanics. (offered fall, spring, summer) Prerequisites: Senior standing; Permission of the chair is required.

MAE 597. Independent Study in Mechanical and Aerospace Engineering, 1-3 Credits.
Individual analytical, computational, and/or experimental study in an area selected by student. Supervised and approved by the advisor. Prerequisites: Senior standing; permission of the chair is required.

MAE 601. Engineering Mathematics, 3 Credits.
Applications of linear algebra, ordinary and partial differential equations, and complex variables to engineering problems.

MAE 602. Fluid Dynamics and Aerodynamics, 3 Credits.
Prerequisites: MAE 601 or MATH 691. Conservation laws for viscous and inviscid flows. Boundary conditions; analytical and numerical solution of viscous flow problems; boundary-layer theory; 2 and 3-dimensional potential flows; applications to airfoils, wings, and internal flows; introduction to turbulence.

MAE 603. Advanced Mechanics of Solids, 3 Credits.
Stress, strain, equilibrium for deformable solids; material behavior of elasticity, hyperelasticity, plasticity and viscoelasticity; failure criteria, fracture; thermal effect; energy methods and their applications to bars and beams for static, stability and dynamic problems.

MAE 604. Analytical Dynamics, 3 Credits.

MAE 605. Advanced Classical Thermodynamics, 3 Credits.
Prerequisites: MAE 601 or MATH 691. Rigorous development of the macroscopic theory of thermodynamics; structural basis for equations of state and general properties of matter; phase and chemical equilibria.

MAE 606. Real-Time Signals and Systems, 3 Credits.
Signals and transforms for real-time systems. Data acquisition theory and practice. System modeling. Applications to modal analysis, experimental aerodynamics, and real-time control.

MAE 607. Continuum Mechanics, 3 Credits.
Indicial notations and tensor calculus; strain and stress tensors, rate of deformation tensor, Eulerian and Lagrangian descriptions, conservation principles, constitutive formulations for elastic solids and viscous fluids, formulation of fluid mechanics and solid mechanics problems. Simple applications.

MAE 608. Applied Mathematics for Engineers, 3 Credits.

MAE 610. Supersonic Flow, 3 Credits.
Prerequisites: MAE 514 and MAE 602. Governing equation for supersonic flow; full potential equations; small disturbance theory; hodographs, method of characteristics; introduction to three-dimensional flows; compressible boundary layer flows; internal flows in nozzles and diffusers, airfoil flows, slender bodies of revolution flows, conical flows, wing flows.

MAE 611. Computational Fluid Dynamics I, 3 Credits.
Prerequisites: MAE 601 or MATH 691. Classification of single PDE’s, finite difference methods; stability analysis, convergence, consistency, efficiency; basics of finite volume methods; model equations of hyperbolic, parabolic and elliptic type; explicit and implicit schemes, central and upwind schemes, weak solutions of quasi-linear hyperbolic equations.

MAE 612. Experimental Aerodynamics, 3 Credits.
Prerequisites: MAE 602 and MAE 610. Techniques for static and dynamic measurement of pressure, temperature, and velocity. Experiment control, statistical treatment of data. Probe methods, including multi-hole pressure probes and hot-wire anemometers. Non-intrusive methods, including Laser Doppler Velocimetry and other optical methods. Surface and stream flow visualization. Surface measurements.

MAE 613. Aerospace Test Facilities, 3 Credits.

MAE 620. Heat Transfer I, 3 Credits.
Aspects of conduction, convection and radiation heat transfer, including governing equations, boundary layer flows, analytical and numerical solutions to one-, two-, and three-dimensional problems.

MAE 622. Theory and Design of Turbomachines, 3 Credits.
Prerequisites: MAE 514 and MAE 602. Real cycles; fluid motion in turbomachines; theory of diffusers and nozzles; fluid-rotor energy transfer; radial equilibrium; transonic stages; combustion chambers; axial and centrifugal turbines; axial and centrifugal pumps and compressors; performance and design criteria; cavitation and two-phase flow considerations.

MAE 623. Nuclear Engineering, 3 Credits.
Nuclear power plant systems; power reactor control and kinetic behavior, including safety coefficients, accumulative poisons, temperature control parameters; primary and secondary plant as a transient system.

MAE 624. Energy Utilization and Conservation, 3 Credits.
Prerequisites: Permission of instructor. Overview of scope of efficient energy utilization in industrial, commercial, transportation, and power generation fields; power plant waste-heat utilization, district heating, combined gas and steam cycle, organic fluid-bottoming cycle, total energy concept for residential and commercial buildings; system management, on-line computer evaluation, energy analysis.

MAE 630. Finite Element Analysis I, 3 Credits.
Prerequisites: MAE 634. Experimental techniques and methods for structural dynamics and modal analysis. Instrumentation utilization including electrodynamic shakers, impact hammers, accelerometers, laser vibrometers, signal analyzers, signal filters, and force transducers. Time and frequency domain data acquisition, assessment, and post-processing. Development of mathematical models from experimental data.
MAE 633. Flight Vehicle Structural Analysis. 3 Credits.

MAE 634. Theory of Vibrations. 3 Credits.
Prerequisites: MAE 504 and MAE 601 or MATH 691. Introduction to applied modal analysis, modes of vibration of discrete systems; modal coordinates, transfer functions in frequency domain, modes of vibration of continuous systems and approximate systems response. Introduction to FE methods and nonlinear vibrations. Applications to rods, beams, plates and shells.

MAE 640. Modern Control Theory. 3 Credits.

MAE 641. Aerospace Vehicle Performance. 3 Credits.
Prerequisites: MAE 602 and MAE 514 or MAE 610. A study of the flight performance of aerospace vehicles. Review of aerodynamic and propulsion characteristics. Range, flight and maneuver envelopes for vehicles in atmospheric flight. Introduction to methods of design and trajectory optimization. Design and performance of launch vehicles. Open-ended, design-oriented project work.

MAE 642. Flight Control Actuators and Sensors. 3 Credits.
Prerequisites: MAE 503, MAE 538, and MAE 604. Overview of governing principles and operations of actuator and sensor hardware used in aircraft and spacecraft flight control systems. Hydraulic, electro-hydraulic and electric actuators. Control jets and momentum wheels. Accelerometers and rate gyro. Air-Data systems. Inertial navigation systems and satellite navigation systems. Dynamic model development, analysis and simulation. Nonlinear hardware characteristics and the influence on closed-loop vehicle behavior.

MAE 650. Composite Materials. 3 Credits.
Prerequisites: Permission of the instructor. Reinforcement, matrices, particulate-composites; short-fiber and continuous-fiber reinforced composites; prediction of elastic failure properties; directionally solidified composites; design considerations; experiments.

MAE 652. Mechanical Behavior of Materials. 3 Credits.
Prerequisites: Permission of instructor. Macroscopic behavior of materials with respect to elasticity, plasticity, and viscoelasticity; yield criteria, fracture, influence of high and low temperatures, corrosion and radiation.

MAE 654. Thermomechanical Processing of Materials. 3 Credits.
Principles of thermal and chemical refining processes; modeling melting and solidification processes; fundamentals of metal castings including flow of molten metal and heat transfer during solidification; superplastic forming of metals, strain crystallizing of polymers; effects of processing on properties.

MAE 667. Cooperative Education in Mechanical and Aerospace Engineering. 1-3 Credits.
Student participation for credit based on academic relevance of the work experience, criteria, and evaluative procedures as formally determined by the department and the Cooperative Education program prior to the semester in which the work experience is to take place. Prerequisites: Approval by Department and Career Management Center.

MAE 668. Internship in Mechanical and Aerospace Engineering. 1-3 Credits.
Academic requirements will be established by the department and will vary with the amount of credit desired. Allows students an opportunity to gain short duration career-related experience. Prerequisites: Approval by Department and Career Management Center.

MAE 669. Practicum in Mechanical and Aerospace Engineering. 1-3 Credits.
Academic requirements will be established by the department and will vary with the amount of credit desired. Allows students an opportunity to gain short duration career-related experience. Student is usually already employed--this is an additional project within the organization. Prerequisites: Approval by Department and Career Management Center.

MAE 670. Computational Methods in Mechanical and Aerospace Engineering. 3 Credits.

MAE 672. Design of Experiments. 3 Credits.
Formal experiment design. Review of statistics. ANOVA, multiple comparisons, residuals, modal adequacy checking. Randomized complete block designs, factorial designs, 2^k factorial and fractional factorial designs, random and mixed effects in factorials, optimization, introduction to response surface methods. Laboratory exercises use designed experiments applied to aerospace testing, including wind tunnel testing and instrument calibration. Prerequisites: MAE 572.

MAE 680. Engineering Software for Computer-Aided Analysis and Design. 3 Credits.
Prerequisites: Permission of the instructor. Introduction to advanced CAD software for finite element modeling and analysis, multibody dynamic analysis, kinematic analysis and design optimization. MSC/NASTRAN, PATRAN, DADS, GENESIS and other commercially available software will be introduced.

MAE 681. Robots and Manufacturing Automation. 3 Credits.

MAE 682. Concurrent Engineering. 3 Credits.
Study of principles of concurrent engineering with emphasis on the design/manufacture interface for single products; Rapid prototyping projects; Design of injection-molded and stamped parts for cost.

MAE 684. Process Modeling and Reengineering. 3 Credits.
Prerequisites: MAE 682. Study of methodologies and available tools to analyze "problem" processes and determine solutions to improve bottom-line performance. A Process Modeling project will be the key component of this course to reinforce the principles of Process Re-Engineering. Another major topic is Parametric Design by Guided Iteration.

MAE 685. Projects Design and Manufacturing. 3 Credits.
Prerequisites: Permission of the instructor. Project(s) course to allow graduate students to complete a practical engineering assignment in design and manufacturing areas.

MAE 686. Engineering Design with Uncertainties. 3 Credits.
Prerequisites: MAE 608. An introduction to managing uncertainties and risk in strength design of mechanical components. A study of theoretical background, computational implementation, and applications of reliability-based methods for engineering analysis and design.

MAE 688. Computational Intelligence for Engineering Design Optimization Problems. 3 Credits.
The concepts and algorithms of computational intelligence and their applications to engineering optimization problems will be discussed. The topics to be covered are artificial neural networks, evolutionary optimization and swarm intelligence. Both single and multi-objective optimization problems with continuous and/or discrete variables will be discussed.

MAE 690. Mechanical and Aerospace Engineering Seminar. 1 Credit.
Regular tutorials on recent topics of interest in mechanical and aerospace engineering and engineering mechanics.

MAE 695. Topics in Mechanical and Aerospace Engineering. 3 Credits.
Special topics of interest with emphasis placed on recent developments in mechanical and aerospace engineeringor engineering mechanics.
MAE 696. Experimental Research Project. 3 Credits.
An independent laboratory experience in the area of either aerodynamics, structural dynamics or applied automatic control. Results will be reported in a format and quality similar to a technical conference paper.

MAE 697. Independent Study in Mechanical and Aerospace Engineering. 3 Credits.
Individual analytical, computational and/or experimental study in an area selected by the student. Supervised and approved by the advisor.

MAE 698. Master’s Project in Mechanical and Aerospace Engineering. 1-3 Credits.
Individual project, investigation under the direction of the student’s major professor.

MAE 699. Thesis Research in Mechanical and Aerospace Engineering. 1-6 Credits.
Thesis research in mechanical and aerospace engineering or engineering mechanics leading to the Master of Science degree. Prerequisites: instructor approval required.

MAE 710. Transonic Aerodynamics. 3 Credits.
Prerequisites: MAE 610. Singular surfaces under the Euler limit; transonic breakdown of linearized theory; transonic expansion procedures; transonic small disturbance theory; transonic slender bodies, similarity rules; hodograph equation; transonic far fields; relaxation schemes; unsteady transonic flows, three-dimensional wings; finite difference methods.

MAE 711. Hypersonic Aerodynamics. 3 Credits.
Prerequisites: MAE 610. General consideration of hypersonic flow and similarity principles, hypersonic flow past slender bodies with sharp and blunt leading edges. Hypersonic blunt-body flow. Real gas, viscous and low density effects, and consideration of nonequilibrium phenomena in hypersonic flows.

MAE 712. Unsteady Aerodynamics and Aeroelasticity. 3 Credits.
Prerequisites: MAE 602, MAE 611, and MAE 634. Oscillating airfoils in incompressible, subsonic and supersonic flows; Arbitrary airfoil motion, Oscillating finite wings; Unsteady motion of finite wings; Unsteady motion of nonlifting bodies; Aéroelastic phenomena; Static and dynamic loads, divergence, control reversal, flutter, dynamic response.

MAE 713. Turbulent Flow. 3 Credits.

MAE 714. Aerodynamic Flow Control. 3 Credits.
Prerequisites: MAE 602 and MAE 610. Introduction and definitions, goals, passive and active control methodologies and techniques. Flow separation control, drag reduction control techniques, flow transition control. Micro-electrical-mechanical systems (MEMS) control, future challenges.

MAE 715. Boundary Layer Theory. 3 Credits.
Prerequisites: MAE 602. Boundary layer equations; method of matched asymptotic expansions; body oriented coordinates, finite-difference solutions; separations, wake and jet flows; thermal and compressible boundary layers, transformations and finite-difference solutions, unsteady boundary layers. Introduction to hydrodynamic stability and turbulence.

MAE 716. Computational and Fluid Dynamics II. 3 Credits.
Prerequisites: MAE 611. Classification of systems of PDE’s; mathematical nature of Euler equations; conservative form of the Navier-Stokes equations; grid generation; central difference schemes; finite volume schemes; upward fluxvector, flux-difference and TVD schemes; boundary conditions.

MAE 717. Microfluidics. 3 Credits.
The course covers mass momentum and energy transport in micro- and nano-scales. Gas transport in the slip, transition and free molecular flow regimes is presented for prototype flows with applications on gas damping of MEMS devices. Electrokinetic transport of liquids and particulate flows are introduced with specific examples on electroosmosis, electrophoresis and dielectrophoresis. Sample handling using chaotic stirring and acoustophoresis in lab on a chip system are demonstrated.

MAE 720. Heat Transfer II. 3 Credits.
Prerequisites: MAE 620. Aspects of conduction, convection and radiation heat transfer, including governing equations, boundary layer flows, analytical and numerical solutions to one-, two- and three-dimensional problems.

MAE 721. Fundamentals of Combustion. 3 Credits.
Prerequisites: MAE 602 and MAE 610. Chemical equilibrium in reacting systems, chemical kinetics of single and multi-step chemical reaction systems, conservation equations for multicomponent reacting systems; Shvab-Zeldovich formulation, detonation and deflagration waves, flammability limits; premixed laminar flames, gaseous diffusion flames; application to engine processes.

MAE 730. Finite Element Analysis II. 3 Credits.
Prerequisites: MAE 630. Application of variational methods to structural mechanics. General finite element development procedures including symbolic computations. Finite element formulations based on alternate variational principles. Applications to plate bending, buckling and vibration. Introduction to non-linear problems.

MAE 731. Mechanics of Composite Structures. 3 Credits.

MAE 733. Nonlinear Aerospace Structures. 3 Credits.
Prerequisites: MAE 633 and MAE 634. Classical and finite element analysis methods for nonlinear aerospace structures of beams, plates, and shallow shells. Application to problems of large bending deflection, thermal post-buckling, large amplitude free vibration, nonlinear panel flutter, and nonlinear random response.

MAE 734. Structural Vibrations II. 3 Credits.

MAE 740. Autonomous and Robotic Systems Analysis and Control. 3 Credits.
Kinematics, dynamics and control of complex non-linear electro-mechanical systems, particularly robotic manipulators.

MAE 741. Optimal Control Theory. 3 Credits.
Prerequisites: MAE 640. Parameter optimization, optimization problem for dynamic systems with terminal and path constraints; optimal feedback control with and without the presence of uncertainty; nonlinear optimal control system.

MAE 742. Multibody Dynamics: Theories and Applications. 3 Credits.
Prerequisites: Permission of instructor. Basic theories are presented for formulation of equations of kinematics and dynamics of systems made of interconnected bodies. Topics include constrained motion, principle of virtual work and constrained dynamics. Examples cover robotic motion and biomechanics applications such as human locomotion.
MAE 745. Kinematic Synthesis of Mechanisms. 3 Credits.
Prerequisites: Permission of instructor. Classification of mechanisms; type and number synthesis, application of graph theory, expert systems for synthesis; introduction to dimensional synthesis via path and function generation; finite displacement theory including concept of poles, circlepoint, and centerpoint curves; structural error minimization using Chebyshev’s approximation; optimization approaches, current applications to robot manipulators, robot hands, space structures, and combustion engines.

MAE 744. Atmospheric Flight Dynamics and Control. 3 Credits.
Prerequisites: MAE 403 or MAE 503 and MAE 604. Principles governing the dynamics and control of vehicles in atmospheric flight. Equations of motion development and solution including inertial/gravitational/ aerodynamic/propulsive loads, linear longitudinal and lateral-directional motions, and nonlinear trim and simulation. Flight control system design and analysis incorporating flying quality requirements, linear conventional/ contemporary and frequency/time domain techniques for control and guidance functions, validation with nonlinear simulation, gain scheduling.

MAE 740. Advanced Control Methodologies. 3 Credits.
Prerequisites: MAE 640. Review of multivariable dynamic math models including state space, transfer function, and matrix fractions. Multivariable design criteria including stability, performance, and robustness. Theory and application of multivariable control design techniques including LQR/LQG/ LTR, H-infinity, Eigenspace Assignment and other advanced methods.

MAE 775. Nanoscale Mechanical and Structural Properties of Materials. 3 Credits.
Elastic and plastic properties of nanoscale materials, strain gradient dislocation plasticity, nanoindentation and nanoindentation creep, thin film mechanical and structural properties, kinetic-based investigations of hardening mechanisms in nanolayer composites.

MAE 751. Fatigue and Fracture. 3 Credits.
Divided into areas of fatigue and fracture; stress-controlled and strain-controlled fatigue; effect of mean stresses, notches, etc.; multiaxial stresses; variable amplitude loading; ductile and brittle fracture; linear elastic fracture mechanics; crack-tip plasticity; fracture testing; applications to fatigue life estimation. Requires permission of the instructor.

MAE 777. Perturbation Methods in Aerospace Engineering. 3 Credits.
Method of multiple scales, derivative expansion, two scales method; generalized method; solvability conditions, acoustic waves in ducts, vibrations of nearly circular membranes, general fourth-order PDE; methods of averaging, KB and KBM methods; canonical variables, LaGrangian and Hamiltonian applications in vibration and wave motion.

MAE 772. Response Surface Methodology. 3 Credits.
Prerequisites: MAE 672. An applied course in response surface methodology with aerospace applications. Empirical model building, method of least squares, second order models, model adequacy checking, canonical analysis. Method of steepest ascent, multiple response optimization. Rotatable, cuboidal and small run designs. Design optimality and efficiency metrics, robust design, restrictions on randomization. Laboratory exercises include RSM applied to wind tunnel testing and optimization.

MAE 780. Engineering Optimization. 3 Credits.
Formulation and solution algorithms for Linear Programming (LP) problems. Unconstrained and constrained nonlinear programming (NLP) problems. Optimum solution for practical engineering systems.

MAE 781. Advanced Design. 3 Credits.
Concepts, principles and procedures related to analysis of stresses and strains in machine components. Consideration of function of parts along with factors such as forces, life required, maximum cost, weight and space restrictions, number of parts to be produced, material selection, mechanics, environmental restrictions. Finite element analysis to illustrate different aspects of stress analysis. Requires permission of the instructor.

MAE 784. Computer Integrated Manufacturing. 3 Credits.
Study of the design, control, and management of integrated production/ manufacturing systems. Topics include modeling of production systems; fundamentals of CAD/CAM; robotics, flexible manufacturing systems, group technology, process planning, concurrent engineering, and shop floor control; CIM architecture and communication. Requires permission of the instructor.

MAE 785. Advanced Manufacturing Technology. 3 Credits.
Treatment of the next generation of manufacturing technology. Topics include additive manufacturing; rapid prototyping; electronic manufacturing; micro and nanofabrication; process simulation; product life cycle management; and sustainable design and manufacturing. Prerequisites: MAE 682 or consent of instructor.

MAE 786. Microfabrication. 3 Credits.

MAE 787. Life Cycle Engineering. 3 Credits.
Prerequisites: MAE 682. Study of environmental impacts of engineering products and processes throughout their life cycle. Emphasis on life cycle assessment, recycling, reusing, remanufacturing, and economic considerations.

MAE 795. Topics in Mechanical and Aerospace Engineering. 3 Credits.
Selected topics in mechanical and aerospace engineering or engineering mechanics.

MAE 797. Independent Study in Mechanical and Aerospace Engineering. 3 Credits.
Individual analytical, computational and/or experimental study in an area selected by the student. Supervised and approved by the advisor.

MAE 810. Transonic Aerodynamics. 3 Credits.
Prerequisites: MAE 610. Singular surfaces under the Euler limit; transonic breakdown of linearized theory; transonic expansion procedures; transonic small disturbance theory; transonic slender bodies, similarity rules; hodograph equation; transonic far fields; relaxation schemes; unsteady transonic flows, three-dimensional wings; finite difference methods.

MAE 811. Hypersonic Aerodynamics. 3 Credits.
Prerequisites: MAE 610. General consideration of hypersonic flow and similarity principles, hypersonic flow past slender bodies with sharp and blunt leading edges. Hypersonic blunt-body flow. Real gas, viscous and low density effects, and consideration of nonequilibrium phenomena in hypersonic flows.

MAE 812. Unsteady Aerodynamics and Aeroelasticity. 3 Credits.
Prerequisites: MAE 602, MAE 611, and MAE 634. Oscillating airfoils in incompressible, subsonic and supersonic flows; Arbitrary airfoil motion. Oscillating finite wings; Unsteady motion of finite wings; Unsteady motion of nonlifting bodies; Aeroelastic phenomena; Static and dynamic loads, divergence, control reversal, flutter, dynamic response.
MAE 813. Turbulent Flow. 3 Credits.

MAE 814. Aerodynamic Flow Control. 3 Credits.
Prerequisites: MAE 602 and MAE 610. Introduction and definitions, goals, passive and active control methodologies and techniques. Flow separation control, drag reduction control techniques, flow transition control. Micro-electrical-mechanical systems (MEMS) control, future challenges.

MAE 815. Boundary Layer Theory. 3 Credits.
Prerequisites: MAE 602. Boundary layer equations; method of matched asymptotic expansions; body oriented coordinates, finite-difference solutions; separations, wake and jet flows; thermal and compressible boundary layers, transformations and finite-difference solutions, unsteady boundary layers. Introduction to hydrodynamic stability and turbulence.

MAE 816. Computational and Fluid Dynamics II. 3 Credits.
Prerequisites: MAE 611. Classification of systems of PDE’s; mathematical nature of Euler equations; conservative form of the Navier-Stokes equations; grid generation; central difference schemes; finite volume schemes; upwind fluxvector, flux-difference and TVD schemes; boundary conditions.

MAE 817. Microfluidics. 3 Credits.
The course covers mass momentum and energy transport in micro- and nano-scales. Gas transport in the slip, transition and free molecular flow regimes is presented for prototype flows with applications on gas damping of MEMS devices. Electrokinetic transport of liquids and particulate flows are introduced with specific examples on electroosmosis, electrophoresis and dielectrophoresis. Sample handling using chaotic stirring and acoustophoresis in lab on a chip system are demonstrated.

MAE 820. Heat Transfer II. 3 Credits.
Prerequisites: MAE 620. Aspects of conduction, convection and radiation heat transfer, including governing equations, boundary layer flows, analytical and numerical solutions to one-, two- and three-dimensional problems.

MAE 821. Fundamentals of Combustion. 3 Credits.
Prerequisites: MAE 612 and MAE 610. Chemical equilibrium in reacting systems, chemical kinetics of single and multi-step chemical reaction systems, conservation equations for multicomponent reacting systems; Shvab-Zeldovich formulation, detonation and deflagration waves, flammability limits; premixed laminar flames, gaseous diffusion flames; application to engine processes.

MAE 830. Finite Element Analysis II. 3 Credits.
Prerequisites: MAE 630. Application of variational methods to structural mechanics. General finite element development procedures including symbolic computations. Finite element formulations based on alternate variational principles. Applications to plate bending, buckling and vibration. Introduction to non-linear problems.

MAE 831. Mechanics of Composite Structures. 3 Credits.

MAE 833. Nonlinear Aerospace Structures. 3 Credits.
Prerequisites: MAE 633 and MAE 634. Classical and finite element analysis methods for nonlinear aerospace structures of beams, plates, and shallow shells. Application to problems of large bending deflection, thermal post-buckling, large amplitude free vibration, nonlinear panel flutter, and nonlinear random response.

MAE 834. Structural Vibrations II. 3 Credits.

MAE 840. Autonomous and Robotic Systems Analysis and Control. 3 Credits.
Kinematics, dynamics and control of complex non-linear electro-mechanical systems, particularly robotic manipulators.

MAE 841. Optimal Control Theory. 3 Credits.
Prerequisites: MAE 640. Parameter optimization, optimization problem for dynamic systems with terminal and path constraints; optimal feedback control with and without the presence of uncertainty; nonlinear optimal control system.

MAE 842. Computational Methods in Multibody Dynamics. 3 Credits.
Prerequisites: Permission of instructor. Basic theories are presented for formulation of equations of kinematics and dynamics of systems made of interconnected bodies. Topics include constrained motion, principle of virtual work and constrained dynamics. Examples cover robotic motion and biomechanics applications such as human locomotion.

MAE 843. Kinematic Synthesis of Mechanisms. 3 Credits.
Prerequisites: Permission of instructor. Classification of mechanisms; and number synthesis, application of graph theory, expert systems for synthesis; introduction to dimensional synthesis via path and function generation; finite displacement theory including concept of poles, circlepoint, and centerpoint curves; structural error minimization using Chebychev’s approximation; optimization approaches, current applications to robot manipulators, robot hands, space structures, and combustion engines.

MAE 844. Atmospheric Flight Dynamics and Control. 3 Credits.
Prerequisites: MAE 403 or MAE 503 and MAE 604. Principles governing the dynamics and control of vehicles in atmospheric flight. Equations of motion development and solution including inertial/gravitational/ aerodynamic/propulsive loads, linear longitudinal and lateral-directional motions, and nonlinear trim and simulation. Flight control system design and analysis incorporating flying quality requirements, linear conventional/ contemporary and frequency/time domain techniques for control and guidance functions, validation with nonlinear simulation, gain scheduling.

MAE 845. Space Flight Dynamics and Control. 3 Credits.
Prerequisites: MAE 604 and MAE 640. Principles governing the dynamics and control of vehicles in space flight. Equations of motion development and solution including inertial/gravitational/aerodynamic/propulsive loads, decoupled translational and attitude motions. Orbital mechanics including elements, initial-value propagation, adjustments/transfers, Lambert boundary-value problem, perturbations, and nonlinear simulation. Attitude dynamics including torque free, gravity moment, axisymmetric/unsymmetric vehicles, and dual spinners. Flight control system design and analysis including impulsive velocities, finite burns, Lambert targeting, linear designingaus moment wheels, and nonlinear phase-plane design using thrusters.

MAE 846. Advanced Control Methodologies. 3 Credits.
Prerequisites: MAE 640. Review of multivariable dynamic math models including state space, transfer function, and matrix fractions. Multivariable design criteria including stability, performance and robustness. Theory and application of multivariable control design techniques including LQR/LQG/ LTR, H-infinity, Eigenspace Assignment and other advanced methods.

MAE 850. Nanoscale Mechanical and Structural Properties of Materials. 3 Credits.
Elastic and plastic properties of nanoscale materials, strain gradient dislocation plasticity, nanindentation and nanoindentation creep, thin film mechanical and structural properties, kinetic-based investigations of hardening mechanisms in nanolayer composites.
MAE 851. Fatigue and Fracture. 3 Credits.
Divided into areas of fatigue and fracture; stress-controlled and strain-controlled fatigue; effect of mean stresses, notches, etc.; multiaxial stresses; variable amplitude loading; ductile and brittle fracture; linear elastic fracture mechanics; crack-tip plasticity; fracture testing; applications to fatigue life estimation. Requires permission of the instructor.

MAE 870. Perturbation Methods in Aerospace Engineering. 3 Credits.
Method of multiple scales, derivative expansion, two scales method; generalized method; solvability conditions, acoustic waves in ducts, vibrations of nearly circular membranes, general fourth-order PDE; methods of averaging, KB and KBM methods; canonical variables, LaGrangian and Hamiltonian applications in vibration and wave motion.

MAE 872. Response Surface Methodology. 3 Credits.
Prerequisites: MAE 672. An applied course in response surface methodology with aerospace applications. Empirical model building, method of least squares, second order models, model adequacy checking, canonical analysis. Method of steepest ascent, multiple response optimization. Rotatable, cuboidal and small run designs. Design optimality and efficiency metrics, robust design, restrictions on randomization. Laboratory exercises include RSM applied to wind tunnel testing and optimization.

MAE 880. Engineering Optimization. 3 Credits.
Formulation and solution algorithms for Linear Programming (LP) problems. Unconstrained and constrained nonlinear programming (NLP) problems. Optimum solution for practical engineering systems.

MAE 881. Advanced Design. 3 Credits.
Concepts, principles and procedures related to analysis of stresses and strains in machine components. Consideration of function of parts along with factors such as forces, life required, maximum cost, weight and space restrictions, number of parts to be produced, material selection, kinematics, environmental restrictions. Finite element analysis to illustrate different aspects of stress analysis. Requires permission of the instructor.

MAE 884. Computer Integrated Manufacturing. 3 Credits.
Study of the design, control, and management of integrated production/manufacturing systems. Topics include modeling of production systems; fundamentals of CAD/CAM; robotics, flexible manufacturing systems, group technology, process planning, concurrent engineering, and shop floor control; CIM architecture and communication. Requires permission of the instructor.

MAE 885. Advanced Manufacturing Technology. 3 Credits.
Treatment of the next generation of manufacturing technology. Topics include additive manufacturing; rapid prototyping; electronic manufacturing; micro and nanofabrication; process simulation; product life cycle management; and sustainable design and manufacturing. Prerequisites: MAE 682 or consent of instructor.

MAE 886. Microfabrication. 2 Credits.

MAE 887. Life Cycle Engineering. 3 Credits.
Prerequisites: MAE 682. Study of environmental impacts of engineering products and processes throughout their life cycle. Emphasis on life cycle assessment, recycling, reusing, remanufacturing, and economic considerations.

MAE 895. Topics in Mechanical and Aerospace Engineering. 3 Credits.
Selected topics in mechanical and aerospace engineering or engineering mechanics.

MAE 897. Independent Study in Mechanical and Aerospace Engineering. 3 Credits.
Individual analytical, computational and/or experimental study in an area selected by the student. Supervised and approved by the advisor.

MAE 899. PhD Dissertation Research in Mechanical and Aerospace Engineering. 1-9 Credits.
Based on the Ph.D candidate’s dissertation research in mechanical and aerospace engineering topics under the direction of the candidate’s advisor. Prerequisites: Instructor approval required.

MAE 999. Mechanical and Aerospace Engineering 999. 1 Credit.
A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term.

MAPD - Math Pedagogy

MATH PEDAGOGY Courses

MAPD 601. Number and Operations for PK-8 Mathematics Specialists. 3 Credits.
Lecture 3 hours; 3 credits. This course will meet the requirements of students in the Master of Science in Education: PK-8 Mathematics Specialist Endorsement Program, and cannot be used for credit toward any degree offered by the Department of Mathematics and Statistics. The course introduces students to a number of topics in PK-8 mathematics and related pedagogical methods. Acknowledging that learning with understanding occurs through a process of establishing a solid knowledge base upon which to build, students will explore the many and varied ways in which PK-8 students may develop number sense. The focus will be upon the development of best practices for teaching mathematics. This requires that the student have knowledge of the content, a variety of pedagogical approaches, and be able to select and utilize appropriate manipulatives and technological resources that will foster PK-8 student understanding.

MAPD 602. Geometry and Measurement for PK-8 Mathematics Specialists. 3 Credits.
Lecture 3 hours; 3 credits. This course will meet the requirements of students in the Master of Science in Education: PK-8 Mathematics Specialist Endorsement Program, and cannot be used for credit toward any degree offered by the Department of Mathematics and Statistics. The course introduces students to a number of topics in PK-8 mathematics and related pedagogical methods. Following a “concrete-to-abstract” developmental learning approach, students will explore the mathematical concepts of measurement and geometry in grades PK-8. Emphasis will be placed upon measurement and geometry content knowledge as well as the pedagogical knowledge specific to mathematics teaching and learning. Students will also learn to use appropriate technology.

MAPD 603. Rational Numbers and Proportional Reasoning for PK-8 Mathematics Specialists. 3 Credits.
Lecture 3 hours; 3 credits. This course will meet the requirements of students in the Master of Science in Education: PK-8 Mathematics Specialist Endorsement Program, and cannot be used for credit toward any degree offered by the Department of Mathematics and Statistics. The course introduces students to a number of topics in PK-8 mathematics and related pedagogical methods. It is designed to engage participants in constructing relational understanding between theoretical development of mathematics and students’ learning of mathematics in the content strands of rational numbers and proportional reasoning. Students will learn how to select and use manipulatives to connect the concrete phase of mathematical learning to the abstract, symbolic phase. Various technologies will be integrated throughout the course as tools to enhance teaching and student understanding.
MAPD 604. Probability and Statistics for PK-8 Mathematics Specialists. 3 Credits.
Lecture 3 hours; 3 credits. This course will meet the requirements of students in the Master of Science in Education: PK-8 Mathematics Specialist Endorsement Program, and cannot be used for credit toward any degree offered by the Department of Mathematics and Statistics. The course introduces students to a number of topics in PK-8 mathematics and related pedagogical methods. It will focus on the content and processes that support the PK-8 students’ learning of probability and statistics. Instruction will cover data collection, display, and analysis as well as the development of a fundamental understanding of probabilistic structures. These structures will be related to real world problem solving and hands-on activities. Technology will be integrated throughout the course to illustrate mathematical concepts, facilitate students exploration, and to make and test hypotheses.

MAPD 605. Algebra and Functions for PK-8 Mathematics Specialists. 3 Credits.
Lecture 3 hours; 3 credits. This course will meet the requirements of students in the Master of Science in Education: PK-8 Mathematics Specialist Endorsement Program, and cannot be used for credit toward any degree offered by the Department of Mathematics and Statistics. The course introduces students to a number of topics in PK-8 mathematics and related pedagogical methods. It will focus on topics that are encountered by middle and high school students as they move from the particular and concrete thinking of school arithmetic to the abstract thinking associated with algebra. The main themes covered include algebraic reasoning, generalization, and justification together with patterns and functions. Various technologies will be integrated within the course content and used as tools to enhance students’ understanding of the concepts of algebra.

MATH - Mathematical Sciences

MATHEMATICAL SCIENCES Courses

MATH 500. History of Mathematics. 3 Credits.
Lecture 3 hours; 3 credits. This course considers some of the major events in the development of mathematics from ancient times through the seventeenth century, including the discovery of incommensurability, the origins of the axiomatic method, trigonometry, solution of equations, calculation of areas and volumes, analytic geometry, probability, and calculus. Students will be graded on tests which consist mostly of problems typical of the periods considered.

MATH 501. Partial Differential Equations. 3 Credits.
Lecture 3 hours; 3 credits. Not available to students with credit in MATH 691. Separation of variable techniques, Sturm-Liouville systems, generalized Fourier series, orthogonal functions of the trigonometric, Legendre and Bessel type boundary value problems associated with the wave equation and the heat conduction equation in various coordinate systems, applications to physics and engineering.

MATH 504. Fundamental Concepts of Geometry. 3 Credits.
Lecture 3 hours; 3 credits. The fundamentals of projective, Euclidean and non-Euclidean geometry are explored by the synthetic method and the algebraic method.

MATH 506. Number Theory and Discrete Mathematics. 3 Credits.
A survey course. Topics include the prime number theorem, congruences, Diophantine equations, continued fractions, quadratic reciprocity, combinatorics, logic, graphs, trees, algorithms, coding and linear programming.

MATH 508. Applied Numerical Methods I. 3 Credits.
An introduction to the numerical methods commonly used by scientists and engineers. Topics include solutions of equations of one variable, direct methods for solving linear systems, matrix factorization, stability analysis, iterative techniques, polynomial interpolation, numerical differentiation and integration, approximation theory, and initial and boundary value problems for ordinary differential equations.

MATH 509. Applied Numerical Methods II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: A grade of C or better in MATH 508. Topics include least squares problems, the QR factorization, the conjugate gradient method, Householder transformation and the QR method for solving approximating eigenvalues and singular values of a matrix. For applications, the finite difference method and the finite element method for solving partial differential equations, trigonometric interpolation and FFT as well as introductory study of optimization are discussed.

MATH 517. Intermediate Real Analysis I. 3 Credits.
A rigorous course in classical real analysis. Topics include the topology of Euclidean n-space, properties of vector valued functions of several variables such as limits, continuity, differentiability and integrability, pointwise and uniform convergence of sequences and series of functions; Fourier series.

MATH 518. Intermediate Real Analysis II. 3 Credits.
A rigorous course in classical real analysis. Topics include the topology of Euclidean n-space, properties of vector valued functions of several variables such as limits, continuity, differentiability and integrability, pointwise and uniform convergence of sequences and series of functions; Fourier series. Prerequisite: A grade of C or better in MATH 517.

MATH 520. Applied Mathematics I: Biomathematics. 3 Credits.
Lecture 3 hours; 3 credits. An introduction to current developments in the mathematical investigation of biological problems. Topics include scaling systems of differential equations, stability, perturbation methods, bifurcation phenomena and wave propagation. Applications are chosen from interacting populations, transport and reaction diffusion kinetics, transmission of nerve impulses, and cardiovascular modeling.

MATH 521. Applied Mathematics II: Mathematical Modeling. 3 Credits.
Lecture 3 hours; 3 credits. A one semester course in formulating, evaluating and validating mathematical models of physical phenomena. Models of traffic flow, mechanical vibrations, combustion, quantum mechanics, wave propagation or other fields of applied mathematics will be examined. Techniques learned in previous courses are used to simplify, analyze and solve these models. New methods introduced include phase-plane analysis, characteristics, calculus of variations and perturbation methods.

MATH 522. Applied Complex Variables. 3 Credits.
Lecture 3 hours; 3 credits. Not available to students with credit in MATH 692. Topics include complex numbers, analytical functions and their properties, derivatives, integrals, series representations, residues and conformal mappings. Applications of the calculus of residues and mapping techniques to the solution of boundary value problems in physics and engineering.

MATH 527. Applied Mathematics III: Elasticity. 3 Credits.
Lecture 3 hours; 3 credits. An introduction to the mathematical theory of linear and non-linear elastic continua. Topics include vectors, tensors, deformation, stress, nonlinear constitutive theory, exact solutions, infinitesimal theory, antiplane strain, plane strain, plane stress, extension, torsion, bending and elastic wave propagation.

MATH 528. Applied Mathematics IV: Fluid Mechanics. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: MATH 501. A mathematical investigation of the differential equations governing fluid flow with an emphasis on steady state incompressible flows. The Navier-Stokes equations are derived and some exact solutions are presented including the potential flow solutions. Topics therefore include classical ideal fluid flow and its complex variable representation, various approximations to the Navier-Stokes equations, boundary layer theory, and also surface and internal gravity wave motion, aspects of hydrodynamic stability theory and convection. Other topics may be introduced by the instructor.
MATH 557. Mathematics in Nature. 3 Credits.
Lecture 3 hours; 3 credits. A calculus and differential equations based
description of many patterns observable in the natural world including wave
motion in the air, oceans, rivers, and puddles; rainbows, halos and other
meteorological phenomena; arrangement of leaves, petals and branches;
height of trees; river meanders; animal and insect markings; mudcracks;
spider webs; and others. Partial differential equations will be discussed as
needed but a knowledge of ordinary differential equations will be assumed.

MATH 596. Topics in Mathematics. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

MATH 598. Tutorial Work in Special Topics in Mathematics. 1-3
Credits.
1-3 credits. Prerequisite: permission of the instructor. Independent study
under the direction of an instructor including library research and reports.

MATH 605. Complex Variables I. 3 Credits.
An advanced course in complex analysis. Prerequisites: MATH 501, MATH
518 and MATH 522.

MATH 615. Advanced Calculus for Teachers. 3 Credits.
An introduction to real analysis. Topics include the field and order axioms,
completeness of the real line, theory of sequences, limits of function,
continuity, differentiability, sequences and series of functions, uniform
convergence. Prerequisites: MATH 212.

MATH 617. Measure and Integration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MATH 518. An introduction to
measure theory and integration theory with special emphasis on Lebesgue
measure and the Lebesgue integral including Fatou’s Lemma, the Monotone
Convergence Theorem and the Dominated Convergence Theorem.

MATH 618. Applied Functional Analysis. 3 Credits.
Topics include orthogonal projections to subspaces, duality, the Hahn-
Banach theorem and the Banach-Steinhaus theorem, L-2 spaces and
convolution operators, fixed point theory, construction of Hilbert
spaces, approximation procedures in Hilbert spaces, and spectral theory.
Prerequisites: MATH 617.

MATH 620. Optimization Techniques. 3 Credits.
Theory and computational algorithms for the optimization of constrained
linear and nonlinear systems or for locating the maximum of a constrained
nonlinear function. Applications to problems in economics, operations
research and systems theory. Prerequisites: MATH 312 and MATH 316.

MATH 622. Numerical Solutions to Differential Equations. 3 Credits.
An in-depth study of the numerical solution to ordinary and partial
differential equations. Topics include linear multi-step methods, Runge-
Kutta methods, stiff differential equations, collocation methods, and strong
and weak stability analysis for ODEs. For PDEs, finite difference methods
are examined. Prerequisites: MATH 509.

MATH 623. Master’s Project. 3 Credits.
3 credits. Prerequisite: permission of graduate program director. Under
the guidance of a faculty member in the Department of Mathematics and
Statistics, the student will undertake a significant data analysis problem in
a scientific setting outside the department. A written report and/or public
presentation of results will be required.

MATH 637. Tensor Calculus and Differential Geometry. 3 Credits.
Topics include metric spaces, bilinear and quadratic forms, tensors, point
manifolds, theory of curves, geodesic differentiation, theory of surfaces,
curvature of general manifolds, integrability. Prerequisites: MATH 517.

MATH 638. Mathematical Theories of Continua. 3 Credits.
Topics include deformation, motion, stress, conservation laws, and
constitutive theories. Prerequisites: MATH 501 and MATH 637.

MATH 691. Engineering Analysis I. 3 Credits.
Not available to students with credit in MATH 501. Separation of variable
techniques, Sturm-Liouville systems, generalized Fourier series, orthogonal
functions of the trigonometric, Legendre and Bessel type, boundary value
problems associated with the wave equation and the heat conduction
equation in various coordinate systems, applications to physics and
engineering.
MATH 725. Computational Fluid Dynamics and Solid Mechanics. 3 Credits.
An introduction to the theory and methodology of computational fluid dynamics and solid mechanics, with an emphasis on the interplay of the two fields, the study of fluid-structure interactions. Topics will include numerical methods for Navier-Stokes equations, computational techniques for free surfaces, theory of Lagrange multipliers, constrained dynamic problems, fluid-structure coupling problems, differential-algebraic equations, and others.

MATH 745. Transform Methods. 3 Credits.
Use of integral transforms for students of applied mathematics, physics and engineering. Integral transforms studied are Laplace, Fourier, Hankel, finite Z-transforms and other special transforms. Prerequisites: MATH 691 and MATH 692.

MATH 750. Calculus of Variations. 3 Credits.
Maximum and minimum techniques in calculus and dynamic programming. Derivation of Euler-Lagrange equations for a variety of conditions, formulation of extremum problems with side conditions for ordinary and partial differential equations. Application to dynamics, elasticity, heat and mass transfer, energy principles and finite element techniques. Prerequisites: MATH 691 and MATH 692.

MATH 755. Introduction to Kinetic Theory and Mesoscopic Methods for Computational Mechanics I. 3 Credits.
The goal of this course is to provide an introduction to kinetic theory and nonequilibrium statistical mechanics, which bridges the microscopic theories and the macroscopic continuum theories of flows. Topics include the molecular dynamics of N particles, Hamiltonian equation, Liouville equation, Boltzmann equation, binary collision, linearized collision operator and its eigen theory, the H-theorem and irreversibility, calculation of the transport coefficients.

MATH 756. Introduction to Kinetic Theory and Mesoscopic Methods for Computational Mechanics II. 3 Credits.
Prerequisites: MATH 755/MATH 855. This is the second part of the study of the interaction between kinetic theory and nonequilibrium statistical mechanics. Models of Boltzmann equation and numerical techniques for hydrodynamic equations (Euler and Navier-Stokes equations) and the Boltzmann equation are studied. Topics include Non-normal and moment method, Maxwell’s moment method, BGK model equation, gas mixtures and transport phenomena in mixtures, the Wang-Chang-Uhlenbeck equation, Enskog equation for dense gases, the lattice Boltzmann equation for incompressible flows, the gas-kinetic scheme for compressible flows and the Direct Simulation Monte Carlo (DSMC) method.

MATH 795. Seminar in Mathematics. 1-3 Credits.
Seminar in advanced topics. Prerequisites: permission of the instructor.

MATH 796. Topics in Mathematics. 1-3 Credits.
Advanced study of selected topics. Prerequisites: permission of the instructor.

MATH 797. Topics in Mathematics. 1-3 Credits.
Advanced study of selected topics. Prerequisites: permission of instructor.

MATH 801. Asymptotic and Perturbation Methods. 3 Credits.
Asymptotic and perturbation methods are developed and used to solve linear and nonlinear differential equations. Included are analyses of Duffing’s Equation, Van der Pol’s Equation, and Mathieu’s Equation. Singular perturbation theory and the Method of Matched Asymptotic Expansions are used to solve equations with boundary layer type solutions. Asymptotic expansions of integrals using Laplace’s Method, Method of Steepest Descent and Method of Stationary Phase are developed. Applications from all areas of applied mathematics are given. Prerequisites: MATH 693.

MATH 802. Integral Equations. 3 Credits.

MATH 803. Advanced Applied Mathematics I. 3 Credits.
Advanced techniques of mathematics applied to specific topics of physical interest. Examples could include high activation energy asymptotics applied to combustion, singular integral equations applied to fracture mechanics, or bifurcation theory applied to non-linear phenomena such as transition to turbulence, phase transitions and hydrodynamic stability. Prerequisites: MATH 702.

MATH 804. Advanced Applied Mathematics II. 3 Credits.
Advanced techniques of mathematics applied to specific topics of physical interest. Examples could include high activation energy asymptotics applied to combustion, singular integral equations applied to fracture mechanics, or bifurcation theory applied to non-linear phenomena such as transition to turbulence, phase transitions and hydrodynamic stability. Prerequisites: MATH 702.

MATH 805. Numerical Linear Algebra. 3 Credits.
Topics include orthogonal vectors and matrices, norms, singular value decomposition, QR factorization, Gram-Schmidt orthogonalization, least squares problems, condition numbers, stability of backward substitution, stability of least squares algorithm, reduction to Hessenberg or tridiagonal form, and the QR algorithm. Prerequisites: MATH 509.

MATH 817. Mathematical Analysis III. 3 Credits.
Topics in mathematical analysis. Measure and integration; classical Banach spaces; operators on linear spaces; Fourier series and integrals. Prerequisites: MATH 617 and MATH 618.

MATH 820. Advanced Applied Functional Analysis. 3 Credits.
In the first half of this course, several concepts in the classical functional analysis are studied; Topics include Banach Spaces, the dual spaces, the Baire category theorem, the adjoint operator, weak convergence, spectral theory and compact operators. In the second half, at the instructor’s discretion, special topics are studied. Possible topics include ill-posed problems, inverse scattering theory, the regular Sturm-Liouville problem and the Dirichlet problem for Laplace’s equation.

MATH 821. Advanced Applied Numerical Methods I. 3 Credits.
Numerical solutions of partial differential equations and integral equations. For PDEs, the finite difference method, the finite element method and the boundary element method are studied. A priori and a posteriori error estimates are examined. For integral equations, topics include Galerkin methods, collocation methods, and the Petrov-Galerkin method. Prerequisites: MATH 501, MATH 508 and MATH 509.

MATH 822. Advanced Applied Numerical Methods II. 3 Credits.
Numerical solutions of partial differential equations and integral equations. For PDEs, the finite difference method, the finite element method and the boundary element method are studied. A priori and a posteriori error estimates are examined. For integral equations, topics include Galerkin methods, collocation methods, and the Petrov-Galerkin method. Prerequisites: MATH 821.

MATH 823. Approximation and Optimization I. 3 Credits.
Introductory and advanced topics representing current research in approximation and optimization techniques for various application problems. Topics include recent developments in algorithms, their analysis, and applications such as data fitting and pattern separation. Prerequisites: permission of the graduate program director.

MATH 825. Computational Fluid Dynamics and Solid Mechanics. 3 Credits.
An introduction to the theory and methodology of computational fluid dynamics and solid mechanics, with an emphasis on the interplay of the two fields, the study of fluid-structure interactions. Topics will include numerical methods for Navier-Stokes equations, computational techniques for free surfaces, theory of Lagrange multipliers, constrained dynamic problems, fluid-structure coupling problems, differential-algebraic equations, and others.
MATH 845. Transform Methods. 3 Credits.
Use of integral transforms for students of applied mathematics, physics and
engineering. Integral transforms studied are Laplace, Fourier, Hankel, finite
Z-transforms and other special transforms. Prerequisites: MATH 691 and
MATH 692.

MATH 850. Calculus of Variations. 3 Credits.
Maximum and minimum techniques in calculus and dynamic programming.
Derivation of Euler-Lagrange equations for a variety of conditions,
formulation of extremum problems with side conditions for ordinary and
partial differential equations. Application to dynamics, elasticity, heat and
mass transfer, energy principles and finite element techniques. Prerequisites:
MATH 691 and MATH 692.

MATH 855. Introduction to Kinetic Theory and Mesoscopic Methods
for Computational Mechanics I. 3 Credits.
The goal of this course is to provide an introduction to kinetic theory
and nonequilibrium statistical mechanics, which bridges the microscopic
theories and the macroscopic continuum theories of flows. Topics include
the molecular dynamics of N particles, Hamiltonian equation, Liouville
equation, Boltzmann equation, binary collision, linearized collision operator
and its eigen theory, the H-theorem and irreversibility, calculation of the
transport coefficients.

MATH 856. Introduction to Kinetic Theory and Mesoscopic Methods
for Computational Mechanics II. 3 Credits.
Prerequisites: MATH 755/MATH 855. This is the second part of the study
of the interaction between kinetic theory and nonequilibrium statistical
mechanics. Models of Boltzmann equation and numerical techniques for
hydrodynamic equations (Euler and Navier-Stokes equations) and the
Boltzmann equation are studied. Topics include Non-normal and moment
method, Maxwell’s moment method, BGK model equation, gas mixtures
and transport phenomena in mixtures, the Wang-Chang-Uhlenbeck equation,
Enskog equation for dense gases, the lattice Boltzmann equation for
incompressible flows, the gas-kinetic scheme for compressible flows and the
Direct Simulation Monte Carlo (DSMC) method.

MATH 895. Seminar in Mathematics. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

MATH 896. Topics in Mathematics. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

MATH 897. Topics in Mathematics. 1-3 Credits.

MATH 898. Research. 1-9 Credits.

MATH 899. Dissertation. 1-9 Credits.

MATH 999. Mathematics 999. 1 Credit.
1 credit. A one-hour pass/fail registration required of all graduate students
to maintain active status during the final semester prior to graduation. After
successfully passing the candidacy examination, all doctoral students are
required to be registered for at least one graduate credit each term until the
degree is complete.

MBA - Master Of Business Admin

MBA 623. Leadership in Organizations. 1 Credit.
Lecture 1 hour; 1 credit. Designed to introduce the student to the concept of negotiation; to examine different types of
negotiations, strategies and tactics; and to begin developing negotiating
skills. Through lectures, class discussions, reading and practical exercises,
the student will be introduced to the concepts and structures of different
types of negotiations; achieve an understanding of some basic principles of
conducting and participating in successful negotiations; and gain experience
from participation in negotiation exercises.

MBA 624. Employment Law and Regulation. 1 Credit.
Lecture 1 hour; 1 credit. This course applies the practical application of
business ethics and compliance in the current business environment and the
important role that it should play in the decision making process. Topics will
include the evolution of business ethics and compliance as a risk mitigation
tool, stakeholder expectations, and the structure of corporate compliance
programs.

MBA 625. Corporate Compliance. 1 Credit.
Lecture 1 hour; 1 credit. This course explores the practical application of
business ethics and compliance in the current business environment and the
important role that it should play in the decision making process. Topics will
include the evolution of business ethics and compliance as a risk mitigation
tool, stakeholder expectations, and the structure of corporate compliance
programs.

MBA 626. Effective Business Writing. 1 Credit.
Lecture 1 hour; 1 credit. This course is designed to provide an understanding
of communications in the management setting. Objectives include
improvement of writing skills by understanding major grammar and
mechanics errors, understanding the importance of audience, tone and style
in professional writing and learning effective letter and memo formats used
in professional writing.

MBA 627. Business Plan Development. 1 Credit.
Lecture 1 hour; 1 credit. This course is designed to provide an integration of skills needed to develop an
effective business plan. Lectures plus students will be assigned clients of the
Entrepreneurial Center. Some students may bring their own projects.

MBA 628. Intellectual Property and Intellectual Asset Management. 3
Credits.
Lecture 3 hour; 3 credit. prerequisites: ACCT 601, BNAL 600, ECON 604,
FIN 605, MGMT 602, and MKTG 603. The course will provide students
with a formal education in patents, patent law, prior art searching and
issues related to enhancing innovation in a technology based organization.
Intellectual asset management will be emphasized through the use of
case studies. There is a possibility of at least one team entering an annual
innovation competition as part of the course as well.

MBA 629. Intellectual Property and Intellectual Asset Management. 3
Credits.
Lecture 3 hour; 3 credit. prerequisites: ACCT 601, BNAL 600, ECON 604,
FIN 605, MGMT 602, and MKTG 603. The course will provide students
with a formal education in patents, patent law, prior art searching and
issues related to enhancing innovation in a technology based organization.
Intellectual asset management will be emphasized through the use of
case studies. There is a possibility of at least one team entering an annual
innovation competition as part of the course as well.

MBA 630. New Venture Creation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: ACCT 601, BNAL 600, ECON
604, MGMT 602, and MKTG 603. This course will immerse students in
the process of conceiving, developing, launching, and running a business.
Students will experience the earliest stages of forming a business and learn
the mechanisms and factors that lead to successful new ventures. This
course will prepare students to intensively create, intelligently evaluate and
insightfully manage new ventures.

MBA 631. Negotiation. 1 Credit.
Lecture 1 hour; 1 credit. Prerequisite: MGMT 602. Designed to introduce
the student to the concept of negotiation; to examine different types of
negotiations, strategies and tactics; and to begin developing negotiating
skills. Through lectures, class discussions, reading and practical exercises,
the student will be introduced to the concepts and structures of different
types of negotiations; achieve an understanding of some basic principles of
conducting and participating in successful negotiations; and gain experience
from participation in negotiation exercises.

MBA 632. Creative Thinking in Business Decisions. 1 Credit.
Lecture 1 hour; 1 credit. Develops understanding and skills in applying
a complete process of creative and critical thinking, problem solving and
decision making in real world business situations. Uses a disciplined process
of thinking, emphasizing both divergence and convergence. Emphasis on
the concept of process awareness as distinct from content involvement.
Individuals will be better equipped to help their organizations, teams, and
selves be more effective, adaptable and flexible in the short and long run.
MBA 634. Communicating with Stakeholders. 1 Credit.
Lecture 1 hour; 1 credit. This course is designed to introduce students to the various stakeholders with special focus on larger corporations. The course will discuss tools of communication with stockholders, customers, employees, mass media, and the public at large. It will address how communications, used effectively, can help improve the accountability demanded of today’s companies.

MBA 635. Six Sigma. 1 Credit.
Lecture 1 hour; 1 credit. Introduction to Six Sigma and its practices. Students will earn Yellow Belt status.

MBA 637. Basics of Business Valuation. 1 Credit.
Lecture, 1 hour; 1 credit. Students will attend a seminar on the importance of the valuation process covering the reasons for valuation, the data gathering and analysis process, the use of the asset, market and income methods and a focus on some of the key controversial areas of valuation.

MVA 695. Selected Topics for MBA Modules. 1 Credit.
Lecture 1 hour; 1 credit. The study of selected topics not offered on a regular basis.

MBA 698. Corporate Field Project. 1-3 Credits.
Students will work with regional firms and non-profits to propose solutions for a real problem facing the firm. Prerequisites: ECON 604, BNA 600, ACC 601, and FIN 605.

MBA 999. MBA 999. 1 Credit.

MDS - Movement Disorders

MOVEMENT DISORDERS Courses

MDS 855. Neuroscience of Motor Control. 3 Credits.
Lecture 3 hours; 3 credits. This course covers neuroscience with specific regard to the fundamental design, organization and workings of the central nervous system (CNS) in the areas of motor control and learning. Topics include normal development of motor control and changes in motor control throughout the lifespan. Mechanisms of normal motor learning will also be explored.

MDS 856. Pathology in Motor Control. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MDS 855. This course expands on the student’s knowledge of changes in the central nervous system and motor control problems that occur as a result of congenital conditions, acquired damage, dysfunction or disease. Topics include patterned changes in movement following stroke, spinal cord injury, Parkinson’s disease, cerebellar disease, CP, sensory disorders, and other pathologies.

MDS 865. Clinical Issues in Biomechanics I. 3 Credits.
Lecture, 1 hour; Lab 4 hours. 3 credits. This course will address issues in biomechanics for different patient populations. Each student will choose a clinical group to study and will develop a proposal including a research question and method of approach for answering that question. Students will begin pilot testing their research method in preparation for data collection.

MDS 866. Clinical Issues in Biomechanics II. 3 Credits.
Lecture, 1 hour; Lab 4 hours. 3 credits. Prerequisite: MDS 865. In this course students will perform data collection and analysis following the methods developed in the first course in the series. The product of this semester will include a submission-ready report of the experiment in the format of an appropriate journal.

MDS 875. Instrumentation in Movement Disorders I. 3 Credits.
Lecture, 1 hour; Lab, 4 hours. 3 credits. This course will provide an overview of data collection and analysis systems that can be used to measure movement in individuals with movement disorders. Data collection techniques will include instrumented gait analysis (VICON, GaitRite), and the use of force and balance plates.

MDS 876. Instrumentation in Movement Disorders II. 3 Credits.
Lecture 1 hour. Lab 4 hours. 3 credits. This course will provide an overview of data collection and analysis systems that can be used to measure movement in individuals with movement disorders. Data collection techniques will include kinesiological EMG, accelerometry, the use of load cells, and the metabolic cart.

MEDT - Medical Technology

MEDICAL TECHNOLOGY Courses

MEDT 503. Management in the Clinical Setting. 3 Credits.
A course concerned with organization and management in the clinical setting including personnel supervision, planning, equipment justification, quality assurance, data processing, budgeting, fiscal techniques, marketing, regulatory agencies, educational methodologies, current issues, as well as legal and ethical considerations. (This is a writing intensive course.)

MEDT 540. Statistical Applications and Data Analysis in the Clinical Laboratory. 3 Credits.
Topics include review of basic statistics used in the laboratory; use of statistics for quality control, reference range determination, method comparisons, test utility assessment, techniques for searching the literature and assessing quality and applicability of published studies; and data organization and retrieval via queries. Students will perform projects, preferably using actual laboratory data, that relate to lecture topics.

MGMT - Management

MANAGEMENT Courses

MGMT 513. Compensation Management. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: MGMT 602. A study of wage theory, practice and problems. Topics include compensation theory, job analysis, job evaluation, wage surveys, incentive plans, benefit programs and special features of compensation for sales, managerial, professional, and public employees.

MGMT 517. Employment Law. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: MGMT 602. An analysis of how the federal and state governments may regulate the employer-employee relationship. Topics include labor relations law, equal employment opportunity law, other current statutory employment law and common law employment issues.

MGMT 552. Organization Development. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisites: MGMT 602. Applications of organizational development theory and processes. Topics include OD Theory, role of change agent, intervention processes, the consulting process, and design and implementation of OD change programs.

MGMT 563. Management Seminar Abroad. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: permission of the chief departmental advisor. A study tour abroad under the direction of a faculty member including on-site visits and management lectures designed to provide insight into differences in management practices in foreign countries. Offered summers only and when available.

MGMT 595. Topics. 3 Credits.

MGMT 599. Selected Topics in Human Resources. 3 Credits.

MGMT 602. Organizational Management. 3 Credits.
Lecture 3 hours; 3 credits. Examine issues and principles in the management of individuals, groups, and organizations. Topics include motivation and reward systems, groups dynamics and team building organization design and change.

MGMT 618. Issues in Human Resource Management. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MGMT 602 or permission of the instructor. An analysis and evaluation of current human resource practices and problems. Examines topics such as human resource planning, selection, development, and compensation.
MGMT 630. Motivation and Leadership. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MGMT 602 or permission of the instructor. This course addresses how managers and organizations can enhance employee productivity and job satisfaction in a competitive global environment. Both the theories and practices of motivation and leadership will be examined.

MGMT 668. Management Internship. 1-3 Credits.
1-3 credits. Prerequisites: MGMT 602, graduate standing and permission of the department chair. This course is a practicum in management, applying theories, concepts, and management techniques in a business setting.

MGMT 695. Selected Topics in Management. 1-3 Credits.
1-3 credits. Prerequisite: permission of the department chair and the graduate program director. Study designed for students who have one or more of the required courses waived, or for students desiring additional work in an area of particular interest in management.

MGMT 721. International Strategic Management. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MGMT 710 or BUSN 800 or permission of the instructor. This course deals with various strategic options available to businesses operating in an international environment. It explores the literature and case materials on multinational companies and the theories and concepts relevant to the analysis of international strategic decisions.

MGMT 750. Business Policy and Strategy. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of the graduate program director. A capstone integrative course on strategy formulation and implementation.

MGMT 821. International Strategic Management. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MGMT 710 or BUSN 800 or permission of the instructor. This course deals with various strategic options available to businesses operating in an international environment. It explores the literature and case materials on multinational companies and the theories and concepts relevant to the analysis of international strategic decisions.

MGMT 830. Strategic Human Resource Management. 3 Credits.
Lecture 3 hours; 3 credits. The course examines strategic issues in human resource management. The course will examine how strategies and policies in areas such as recruitment, selection, training, career development, performance management and international human resource management influence firm performance. Other topics of current research may also be included.

MGMT 835. Organization Theory. 3 Credits.
Lecture 3 hours; 3 credits. This course examines theories and empirical research on organizations and their environment. Topics would include organization design, structure, decision making, change and adaptation. Other topics of current research may also be included.

MGMT 838. Strategic Entrepreneurship Seminar. 3 Credits.
This doctoral seminar will expose students to the theory and research behind new business creation and corporate entrepreneurship and it will prepare students to do rigorous and relevant research in this particular topic. Prerequisites: MGMT 835.

MGMT 840. Strategy Classics. 3 Credits.
Lecture 3 hours; 3 credits. This course covers the classic texts and papers in the field of strategic management. This course will also include a discussion of the great debates within the field.

MGMT 842. Strategy Content Research. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MGMT 835 and 840 or departmental approval. This course focuses on research on strategy formation. Topics include business and corporate strategy, competitive dynamics, environmental analysis resource-based view, and strategic groups. Other topics of current research may also be included.

MGMT 845. Strategy Content Research. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: MGMT 840 and 842. This course critically evaluates the classical debates and viewpoints within strategic management research. In addition the course would cover the emerging theoretical and methodological areas in strategic management research. Finally, the course will review in depth the research on contemporary issues in strategy. The objective of the course is to enable students to become independent scholars in the area of strategic management.

MGMT 891. Strategic Entrepreneurship Seminar. 3 Credits.
3 credits. Prerequisite: MGMT 835. This doctoral seminar will expose students to the theory and research behind strategic entrepreneurship and prepare them to do rigorous and relevant research in this field of study.

MGMT 896. Selected Topics in Management. 1-3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MGMT 840. Advanced study in selected topics in management planning, strategy and policy under the direction of one or more faculty in the Management Department.

MGMT 899. Dissertation. 1-9 Credits.

MARKETING Courses

MGKTG 603. Marketing Management. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Fundamentals of marketing (including market research, product design, distribution, pricing and promotion of goods, services, people, places and ideas) with case analyses to clarify applications.

MGKTG 621. Managerial Problems in Marketing Strategy. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MKTG 603 or permission of instructor. Lecture, case analysis and discussion of marketing from the business executive’s viewpoint. Recent developments in marketing and related disciplines and their application in management. Readings, case analysis, discussion.

MGKTG 625. Marketing Research Methods and Analysis. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: MKTG 603 and DSCI 600 or permission of instructor. Examines the various methods of marketing research design. Covers experimental methods, sampling procedures, measurement techniques, and other methodological problems in marketing research. The student is introduced to data analysis and statistical modeling programs.

MGKTG 628. Marketing of Services. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MKTG 603 or permission of instructor. This course examines the application of marketing principles and techniques to service organizations. Topics covered include the nature of services, distribution, and promotion considerations. Class discussion revolves around a textbook, cases, and outside readings. Students take part in a major group project which will involve the development of a marketing plan for a service organization.

MGKTG 630. Ethics and Marketing Decision-Making. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MKTG 603 or permission of instructor. Marketing, probably more than other professionals, often are faced with decisions involving an ethical issue. This course has the following objectives: 1) to examine the ethical decision-making process of marketing professionals, 2) to examine the major ethical issues confronting marketers, 3) to provide frameworks to help resolve the ethical dimensions of marketing decisions, and 4) to provide experience in making marketing decisions that involve ethical dilemmas through the use of case studies.

MGKTG 640. Global Marketing Management. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: MKTG 603 or permission of instructor. Examines the global environment of business and its potential effects on marketing principles and practices. The course will include the effect of culture on marketing mix strategies.
MKTG 650. Marketing on the Internet. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MKTG 603. Course examines the application of marketing theories to the internet. Topics include internet marketing strategy, electronic commerce, web page development, and the impact of the internet in the international marketplace.

MKTG 660. Advertising and Integrated Marketing Communications. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MKTG 603 or permission of instructor. Introduces students to the concepts of integrated marketing communications (IMC). Students will learn how to formulate a firm’s marketing communication strategy from an integrated perspective, become familiar with the various tools used in IMC programs, and develop necessary skills to develop an IMC plan for a business. Topics covered in the course include the role of the IMC in the marketing process, the IMC plan development process, the components of IMC media planning and budgeting for IMC, creative strategies, and assessment of the effectiveness of an IMC campaign.

MKTG 668. Marketing Internship. 1-3 Credits.
1-3 credits. Prerequisites: MKTG 603, graduate standing, and permission of instructor. The course is a practicum in the field of marketing, applying theories, concepts, and marketing tools in a business environment.

MKTG 670. Consumer Marketing. 3 Credits.
Lecture 3 hours; 3 credits. Instructor approval required. Prerequisite: MKTG 603. The objective of this course is to understand the key theoretical concepts underlying consumer behavior and measurement of important customer-oriented marketing constructs. The goal is to understand how to apply these findings to substantive marketing problems and programs.

MKTG 696. Selected Topics in Marketing. 1-3 Credits.
3 hours; 3 credits. Prerequisites: permission of the graduate program director. Study designed for students who have had one or more of the required courses waived, or for students desiring additional work in a marketing area of particular interest.

MKTG 801. Seminar in Marketing Theory: History and Current Topics. 3 Credits.
Seminar 3 hours; 3 credits. Prerequisite: MKTG 603. This course focuses on theory development in marketing from the 1940s to the latest publications in marketing journals. The topics covered include philosophy of science, truth in research, the development of marketing theory and practice, and the current direction in marketing theory and research opportunities.

MKTG 802. Seminar in Marketing Concepts and Issues. 3 Credits.
Lecture 3 hours; 3 credits. This course examines the current academic research trends in the different functional areas of the marketing discipline. Topics covered include promotional theory, pricing theory, distribution theory, product theory, marketing strategy theory, marketing ethics, and multinational marketing.

MKTG 803. Seminar in Consumer Behavior. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MKTG 603. The purpose of this course is to provide a comprehensive and up-to-date understanding of the major research work carried out in consumer behavior. It examines major psychological constructs and phenomena related to consumer behavior and introduces students to various research approaches to consumer behavior issues.

MKTG 813. Fundamentals of Survey Research. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: DSCI 711/811. This course focuses on the fundamental issues associated with survey research as found in the marketing/management disciplines. The topics covered are experimental and quasi-experimental designs, analysis of data from experimental designs, questionnaire design and refinement, and scale development. (cross-listed with DSCI 813).

MKTG 814. Seminar in Advanced Marketing Methodology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: DSCI 811, 812 and MKTG/DSCI 813. This course examines the design, analysis, and implementation of marketing research methods along with advanced statistical techniques. This is an integrative capstone course for the marketing research doctoral sequence of courses. The focus is on ensuring that the marketing academic understands all aspects of data analysis and design issues.

MKTG 826. Seminar in International Marketing Problems. 3 Credits.
Seminar 3 hours; 3 credits. Prerequisite: MKTG 603. An analysis of planning, organization, and control functions of multinational marketing operations and how marketing procedures need to be developed/adapted for effective pursuit of business opportunities in other countries.

MKTG 827. Seminar in Marketing Planning and Strategy. 3 Credits.
Seminar 3 hours; 3 credits. Prerequisite: MKTG 603. Focus on contemporary marketing practice and provides opportunity to acquire a comprehensive understanding of the marketing planning process and the need for development of sound marketing strategy. Marketing goals, strategies, and tactics are examined in detail.

MKTG 895. Selected Topics in Marketing. 3 Credits.
3 credits; 3 hours. Prerequisites: Ph.D. standing and permission of the chair and coordinator. Designed to provide the advanced student with an opportunity to study independently or in small groups and investigate specific topics of current interest in the field of marketing.

MKTG 899. Dissertation Research. 1-12 Credits.
1-12 credits per semester with limitation of 24 credits. Prerequisite: advanced standing in Ph.D. program.

MLRS - Medical Lab/Radiation Sci

MEDICAL LAB/RADIATION SCI Courses

MLRS 500. Principles of Molecular Pathology and Clinical Diagnostics. 3 Credits.
Basic concepts of molecular pathology and clinical diagnostics including nucleic acids, DNA replication, transcription, proteins, mutations and chromosome changes that underlie inherited and acquired/infectious disease, inheritance patterns and genetics as applied to oncology, cardiac disease and organ transplants. Covers emerging molecular/cytologic/histologic methods (amplification, hybridization and microarrays) to detect disease markers, monitor therapy and assess identity; pharmacogenomics and legal/ethical issues of genetic testing. Prerequisites: permission of instructor.

MLRS 501. Molecular Diagnostics Laboratory. 3 Credits.
Course includes hands-on experience with or discussion of diagnostics instrumentation and assays using nucleic acid and protein extraction, gel electrophoresis, hybridization techniques, standard and real time polymerase chain reaction PCR), reverse transcription, DNA sequencing, autoradiography, flow cytometry, microarrays and proteomics-based methods. Pre- or corequisite: MLRS 500 or permission of instructor.

MLRS 600. Advanced Clinical Applications of Molecular Diagnostics. 3 Credits.
Course will cover 1) new applications of standard molecular diagnostic techniques, and 2) cutting edge technologies, instrumentation and technical advances, both as applied to clinical case studies. Emphasis will be on pharmacogenomics and disease processes including inherited conditions, cancer, hemopathology, infectious diseases, mental retardation and developmental delay. Innovative technologies covered include comparative genomic hybridization, pyrosequencing and bead based assays Prerequisites: MLRS 500, MLRS 501 or permission of instructor.

MLRS 601. Advanced Molecular Diagnostics Laboratory. 3 Credits.
Enrollment is limited to students involved in research requiring specific laboratory experience; these students must register for this course. This course provides hands-on experience in the use of molecular diagnostic techniques, including standard and real-time polymerase chain reaction (PCR), hybridization, capillary electrophoresis, and microarrays. Prerequisites: MLRS 500, MLRS 501 or permission of instructor.
MLRS 668. Clinical Laboratory Internship. 3 Credits.
An optional three-week supervised rotation in a hospital-based molecular diagnostic laboratory or a molecular research laboratory. Prerequisites: MLRS 500, MLRS 501, MLRS 600, and MLRS 601 or permission of instructor.

MLRS 714. Molecular Diagnostics Laboratory. 2,3 Credits.
Laboratory rotation with a pre-designated faculty member in which the student obtains hands-on experience. Designed for graduate students to sample different types of research models, techniques, and subject matter without the commitment of dissertation level involvement. Prerequisites: Graduate Program Director approval required.

MLRS 805. Fundamentals of Cancer Biology. 3 Credits.
Course will cover molecular aspects of cancer including DNA damage, tumor viruses, cell cycle regulation, oncogenes and tumor suppressor genes and their respective roles in cancer prevention/development, genes involved in promoting or inhibiting metastasis, angiogenesis, telomerases and telomerase, regulation of both apoptosis and autophagy in normal and cancer cells, cancer stem cells, and diagnostic screening assays for therapeutic responses or resistance in cancer patients. Prerequisites: MLRS 600 and MLRS 601 or equivalents; instructor approval also required.

MLRS 810. Molecular Basis of Health and Disease. 3 Credits.
Emphasis is on human genetic syndromes and disorders associated with dysregulation of key signal transduction pathways that control gene expression, cell growth and protein synthesis including the Ras/MAPK pathway, tuberous sclerosis complex-mammalian target of rapamycin, PI3-kinase and others. Diagnosis, screening and treatment will be covered. Prerequisites: MLRS 600 and MLRS 601.

MLRS 814. Molecular Diagnostics Laboratory. 2,3 Credits.
Laboratory rotation with a pre-designated faculty member in which the student obtains hands-on experience. Designed for graduate students to sample different types of research models, techniques, and subject matter without the commitment of dissertation level involvement. Prerequisites: Graduate Program Director approval required.

MLRS 895. Topics in Molecular Medicine. 1 Credit.
Student led presentations of current topics related to molecular medicine. Prerequisites: Instructor approval required.

MLRS 898. Supervised Research in Molecular Biology and/or Diagnostics. 3-6 Credits.
Supervised doctoral research in molecular diagnostics or biomedical studies. Prerequisites: MLRS 600 and MLRS 601; instructor approval required.

MPHO - Master Of Public Health

MASTER OF PUBLIC HEALTH Courses

MPHO 610. Introduction to Public Health Practice. 3 Credits.
Lecture hours 3; 3 credits. This introductory readings course provides students with an overview of the public health sector from a local, national, and global perspective. The history of public health and recent events leading to a complete transformation of service delivery are two of the topics presented.

MPHO 611. Social and Behavioral Sciences for Public Health. 3 Credits.
Lecture hours 3; 3 credits. This course introduces those social and behavioral science concepts relevant to public health practice. Social and behavioral models that may influence population based health programs are emphasized with projects designed to demonstrate their use.

MPHO 612. Statistical Reasoning for Public Health. 3 Credits.
Lecture hours 3; 3 credits. This course introduces the application of quantitative reasoning in public health practice through the use of descriptive and inferential statistics. Students develop a project to demonstrate the application of statistical reasoning to population health concerns such as health disparities.

MPHO 613. Environmental Sciences for Public Health Practice. 3 Credits.
Lecture 3 hours; 3 credits. This course provides an introduction to the chemical, physical, and biological factors affecting human health and well-being. The application of controls to prevent disease and maximize environmental quality is emphasized.

MPHO 614. Epidemiology for Public Health Practice. 3 Credits.
Lecture 3 hours; 3 credits. This course provides an introduction to the methodology used to detect the incidence and prevalence of disease in populations. The basic principles of epidemiology are presented within an applied concept; projects emphasizing public health practice are assigned.

MPHO 615. Health Services Administration in Public Health. 3 Credits.
Lecture hours 3; 3 credits. This course covers the application of management concepts to public health systems or settings that use a public health perspective in service delivery. Special emphasis is placed on experiential exercises that integrate management theory with public health practice.

MPHO 620. Aging and Health. 3 Credits.
Lecture 3 hours; 3 credits. This course addresses the aging process using an ecological model of health to examine the impact on individuals and society.

MPHO 630. Social Marketing for Health Populations. 3 Credits.
Lecture hours 3; 3 credits. This course examines social marketing concepts and tools for influencing health behavior change. Students learn how to design, implement, and evaluate strategies for social marketing campaigns.

MPHO 633. Financing Healthcare. 3 Credits.
Lecture 3 hours; 3 credits. Students will examine financial evaluation of the health care industry, the source of funds, and the effects of changing patient policies. Other topics of interest will be financial strategies, budgets and capital outlay. Cross-listed with CHF 633.

MPHO 650. Global Health Issues. 3 Credits.
Lecture 3 hours; 3 credits. This course includes the political, social, cultural, and ethical issues for disease prevention and health promotion in developing countries. Students learn to identify international health prerogatives aimed at improving health status through education and intervention.

MPHO 656. Addiction Issues in Health Promotion Education. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on facts about drugs and drug abuse, on value judgments concerning drugs, and on interaction of facts and value judgments. The emphasis is on drug abuse prevention.

MPHO 660. Healthcare Informatics. 3 Credits.
Lecture 3 hours; 3 credits. This course examines the availability, use of interpretation of data obtained from traditional and new data systems used for population health monitoring. Included are public health surveillance systems, vital statistics, hospital discharge data, Health Plan Employer Data and Set (HEDIS), immunization information, school health data, 1996 Health Insurance Portability and Accountability Act (HIPAA), and regulatory agency data related to health.

MPHO 669. Public Health Practicum. 3 Credits.
This course provides students with an opportunity to engage in public health practice in the community or in a working environment. Students who have not work experience may want to consider the practicum as an elective course. Students currently employed in the public health sector may want to use the practicum as an elective to develop a work related project.

MPHO 672. Policy and Politics in Public Health. 3 Credits.
Lecture 3 hours; 3 credits. This course enables the student to develop systematic and analytical frameworks for understanding health and healthcare policy issues. The course will introduce the policy process, background research necessary for policy implementation, and implementation strategies. Cross-listed with HLSC 722.

MPHO 687. Legal Aspects of Health Services. 3 Credits.
Lecture 3 hours; 3 credits. This course provides information concerning the legal requirements affecting the health care industry. The course provides a survey of the basic concepts and content in the major areas of health law, an explanation and identification of sources of legal authority, and a familiarity with legal language.
MPHO 688. Grant Writing for Public Health Practice. 3 Credits.
Covers issues and problems concerned with the development of grants and contracts as they relate to the health professions. The course focuses on the multiple roles of funding agencies and the importance of matching the interests of the grant seeker with the corresponding funding agency.

MPHO 689. Capstone Project. 3-6 Credits.
3-6 credit hours. The Capstone Project must be taken as the final course for the MPH degree. In this course a student works with a faculty preceptor and a community preceptor to produce a product useful to public health practice in environmental health (e.g. a paper, a manuscript, a grant, complete an internship, a work related project). The student must also complete a portfolio containing an activity log and relevant information gathered over the course of study to demonstrate the mastery of theoretical and applied concepts.

MPHO 691. Grant Writing for Public Health Practice. 3 Credits.
Lecture 3 hours; 3 credits. This course provides an introduction to grants and contracts useful on public health practice. Guidelines for funding development will be examined and students will write a grant. Those students with little or no experience in grant writing are encouraged to take this course as an elective or take the capstone for 3 credit hours thereby leaving room in the course of study for this course.

MPHO 695. Topics in Public Health. 1-3 Credits.

MSCM - Maritime Supply Chain Mgmt

MARITIME SUPPLY CHAIN MGMT Courses

MSCM 530. Strategic Sourcing and Purchasing Management. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: ACCT 601 and OPMT 611.
An overview of the strategic sourcing of materials and services in the organization and its role in the supply chain. Topics include sourcing decisions, price/cost analysis, quality issues, purchasing, supplier selection, legal and ethical issues, third party logistics, freight forwarding, and acquisition of services and capital assets.

MSCM 568. Distribution Center and Material Handling Management. 3 Credits.
This course is designed to investigate the strategic role of distribution center and material management in the supply chain. Course content includes the analysis of distribution center operations through the study of design, system selection, and layout configuration as well as the evaluation of material handling and inventory management options. Pre- or corequisite: MSCM 441 or BNAL 441 or permission of the instructor.

MSCM 595. Topics in Maritime and Supply Chain Management. 3 Credits.
3 credits. Prerequisite: Permission of the instructor. A study of selected topics within maritime and supply chain management designed to provide an in-depth exploration of current issues.

MSCM 610. International Shipping and Supply Chain Management. 3 Credits.
Lecture 3 hours; 3 credits. Examines international freight transportation and terms for movement of international trade; focuses on improving supply chain relationships in the movement of international trade/directing the flow of information, materials and products. (cross-listed with PORT 610).

MSCM 615. Maritime Security and Risk Analysis. 3 Credits.
Lecture 3 hours; 3 credits. An overview of international and U.S initiatives to ensure the security of vessels, cargo, people, and infrastructure within the maritime domain. In addition to the impacts of regulatory requirements on maritime commerce, the course also addresses maritime threats to the international economy (including maritime piracy and maritime terrorism), maritime coalitions, and state-of-the-art techniques and tools for safeguarding oceanborne commerce. (cross-listed with PORT 615).

MSCM 616. Supply Chain and Reverse Logistics. 3 Credits.
Lecture 3 hours; 3 credits. This course explores Supply Chain and Reverse Logistics concepts related to quantitative models and Modeling and Simulation (M&S) to provide solutions to common and complex problems faced by businesses and government agencies. (cross-listed with PORT 616).

MSCM 617. Transportation Intermediaries. 3 Credits.
Lecture 3 hours; 3 credits. An overview of the document, role and functions of transportation intermediaries. The relationships between intermediaries, carriers and shippers are discussed as well as the major intermediaries and their competitive strategies. The customers of various international trade and supply chains of intermediaries are also discussed. (cross-listed with PORT 617).

MSCM 641. Supply Chain Management and Logistics. 3 Credits.
Prerequisites: OPMT 611 or instructor’s permission. Supply chain management integrates all activities associated with the flow of materials and information from product start to customers. Examples include order processing, warehousing, inventory management, transportation and logistics, and the costs and information systems supporting these activities. Particular application is made to global logistics systems supporting port and maritime activities. Supply chain relationships can be improved through effective integration of management and via such technologies as the World Wide Web, electronic data exchange, and enterprise resource planning (ERP). (cross-listed with DSCI 641).

MSCM 890. Seminar in Business Process and Enterprise Systems. 3 Credits.
Prerequisites: IT 800 or DSCI 800. This course discusses how firms achieve business excellence through business process management (BPM), business process improvement (BPI), and business process reengineering (BPR) supported by IT. Topics include business process and workflow modeling, analysis, integration, monitoring and management.

MSCM 893. Seminar in Supply Chain in E-Business. 3 Credits.
Prerequisites: IT 800. This course examines the development of information technologies related to supply chain management in a global e-business environment. Topics include managing material flow processes, maritime, logistics, procurement, inventory and distribution. (cross-listed with IT 893).

MSIM - Modeling And Simulation

MODELING AND SIMULATION Courses

MSIM 506. Introduction to Distributed Simulation. 3 Credits.
An introduction to distributed simulation. Topics include motivation for using distributed simulation, distributed simulation architectures, time management issues, and distributed simulation approaches. Current standards for distributed simulation are presented.

MSIM 508. Introduction to Game Development. 3 Credits.
Requires an understanding of physics and either CS 361 or MSIM 331. An introductory course focused on game development theory and modern practices with emphasis on educational game development. Topics covered include game architecture, computer graphics theory, user interaction, audio, high level shading language, animation, physics, and artificial intelligence. Students will develop games related to science, technology, engineering, and mathematics (STEM) education. The developed games can run on a variety of computer, mobile, and gaming platforms.

MSIM 510. Model Engineering. 3 Credits.
The goal of this course is to develop understanding of the various modeling paradigms appropriate for capturing system behavior and conducting digital computer simulation of many types of systems. The techniques and concepts discussed typically include UML, concept graphs, Bayesian nets, Markov models, Petri nets, system dynamics, Bond graphs, etc. Students will report on a particular technique and team to implement a chosen system model. (cross-listed with ECE 510).
MSIM 541. Computer Graphics and Visualization. 3 Credits.
An introduction to graphical systems and methods. Topics include surfaces, solids, and realism techniques such as visible surface, lighting, shadows, and surface detail. Applications to modeling and simulation including 2-D and 3-D solid models, data visualization, and animation. Prerequisite is CS 250.

MSIM 551. Analysis for Modeling and Simulation. 3 Credits.
An introduction to analysis techniques appropriate to the conduct of modeling and simulation studies. Topics include input modeling, random number generation, output analysis, variance reduction techniques, and experimental design. In addition, techniques for verification & validation are introduced. Course concepts are applied to real systems and data.

MSIM 595. Topics in Modeling and Simulation Engineering. 3 Credits.
Special topics of interest with emphasis placed on recent developments in modeling and simulation engineering.

MSIM 596. Topics in Modeling and Simulation Engineering. 3 Credits.
Special topics of interest with emphasis placed on the recent developments in modeling and simulation engineering. Prerequisites: permission of the instructor.

MSIM 597. Independent Study in Modeling and Simulation Engineering. 3 Credits.
Individual analytical, computational, and/or experimental study in an area selected by the student. Supervised and approved by the advisor.

MSIM 601. Introduction to Modeling and Simulation. 3 Credits.
Modeling and simulation (M&S) discipline surveyed at an overview level of detail. Basic terminology, modeling methods, and simulation paradigms are introduced. Applications of M&S in various disciplines are discussed. The course provides a general conceptual framework for those interested in using M&S and for further studies in M&S. Not open to MSVE degree seeking students.

MSIM 602. Simulation Fundamentals. 3 Credits.
An introduction to the modeling and simulation discipline. Introduction to discrete event simulation (DES) including simulation methodology, input data modeling, output data analysis, and an overview of DES tools. Introduction to continuous simulation (CS) including simulation methodology, differential equation models, numerical solution techniques, and an overview of CS tools. Prerequisites: graduate standing; undergraduate preparation in calculus and probability & statistics; and computer literacy.

MSIM 603. Simulation Design. 3 Credits.
Course develops the computer software skills necessary for the design and development of simulation software. Topics covered include software architectures, software engineering, software design, object-oriented programming, abstract data types and classes, data structures, algorithms, and testing and debugging techniques. Software design and development of simulation systems (discrete-event, continuous, and Monte Carlo) are emphasized. Prerequisite: MSIM 602 and an introductory computer programming course.

MSIM 607. Machine Learning I. 3 Credits.
Course provides a practical treatment of design, analysis, implementation and applications of algorithms. Topics include multiple learning models: linear models, neural networks, support vector machines, instance-based learning, Bayesian learning, genetic algorithms, ensemble learning, reinforcement learning, unsupervised learning, etc. (Cross listed with ECE 607).

MSIM 660. System Architecture and Modeling. 3 Credits.
Students will learn the essential aspects of the system architecture paradigm through environment and analysis of multiple architecture framework and enterprise engineering, such as IDEFO, TOGAF, DODAF and OPM. Emphasis on system modeling and enterprise engineering. (Cross listed with ENMA 660).

MSIM 667. Cooperative Education. 1-3 Credits.
Available for pass/fail grading only. Student participation for credit based on academic relevance of the work experience, criteria, and evaluation procedures as formally determined by the program and the Cooperative Education/Career Management program prior to the semester in which the work experience is to take place.

MSIM 669. Practicum. 1-3 Credits.
Academic requirements will be established by the graduate program director and will vary with the amount of credit desired. Allows students an opportunity to gain short-duration career related experience. Student is usually employed--this is an additional project beyond the duties of the student’s employment.

MSIM 671. Cyber Systems Engineering. 3 Credits.
Course provides an overview of functioning of cyber systems including how a computer interacts with the outside world. The composition of critical infrastructure and functioning of different engineered systems that form critical infrastructure are discussed. Mutual dependence and interactions between cyber systems and other engineered systems and the resulting security risks are also explored. (Cross-listed with ENMA 671).

MSIM 672. Threat Modeling and Risk Analysis. 3 Credits.
Course discusses how to develop cyber threat models using attack graphs/trees, STRIDE, Universal Modeling Language (UML), attack graphs/trees and common of risk analysis tools. Course also discusses the need for quantitative security analysis and formal validation of security models and basic principles of formal model validation. (Cross-listed with ENMA 672).

MSIM 695. Topics in Modeling and Simulation. 3 Credits.
Special topics of interest with emphasis placed on recent developments in modeling and simulation.

MSIM 697. Independent Study in Modeling and Simulation. 3 Credits.
Individual study selected by the student. Supervised and approved by a faculty member with the approval of the graduate program director. Prerequisites: permission of instructor or graduate program director.

MSIM 699. Thesis. 1-6 Credits.
Research leading to the Master of Science thesis. Prerequisites: permission of instructor and graduate program director.

MSIM 702. Methods of Rational Decision Making. 3 Credits.
Covers advanced methods in Operation Research and Optimization. Focus will be on developing models and their application in different domains including manufacturing and services. (Cross listed with ENMA 702/ENMA 802).

MSIM 711. Finite Element Analysis. 3 Credits.
Prerequisites: permission of the instructor. The purpose of the course is to provide an understanding of the finite element method (FEM) as derived from an integral formulation perspective. The course will demonstrate the solutions of (1-D and 2-D) continuum mechanics problems such as solid mechanics, fluid mechanics and heat transfer.

MSIM 722. Cluster Parallel Computing. 3 Credits.
This course provides detailed numerical step-by-step procedures to exploit parallel and sparse computation under MPI (Message, Passing, Interface) computer environments. Large-scale engineering/science applications are emphasized. Simultaneous linear equations are discussed.

MSIM 725. Principles of Combat Modeling and Simulation. 3 Credits.

MSIM 730. Simulation Formalisms. 3 Credits.
The focus of the course is on identification and investigation of mathematical and logical structures that form the foundation for computational simulation. Topics include: foundations of simulation theory in logic, discrete mathematics, and computability; simulation formalisms, including DEV'S; interoperability protocols; and computational complexity. Prerequisites: MSIM 601 or equivalent.
MSIM 741. Principles of Visualization, 3 Credits.
Well-designed graphical media capitalizes on human facilities for processing visual information and thereby improves comprehension, memory, inference, and decision making. This course teaches techniques and algorithms for creating effective visualizations based on principles and techniques from graphic design, visual art, perceptual psychology and cognitive science. Both users and developers of visualization tools and systems will benefit from this course.

MSIM 742. Visualization II, 3 Credits.
Prerequisites: MSIM 641 or permission of instructor. Course discusses a variety of topics in advanced visualization theory and applications. Topics included visualization, level of detail techniques, animation, terrain visualization, flow and ocean visualization, and cal imaging and visualization.

MSIM 751. Advanced Analysis for Modeling and Simulation, 3 Credits.
An introduction to stochastic dependence and Bayesian analysis techniques for conducting modeling and simulation studies. Topics include: measures of dependence, common multivariate distributions, sampling from multivariate distributions, elementary time series models and Bayesian statistics. Prerequisites: MSIM 441 or MSIM 551.

MSIM 772. Modeling Global Events, 3 Credits.
Modeling Global Events introduces modeling and simulation as a tool for expanding our understanding of events that have shaped the global environment of the 21st century. Students will review real-world case studies and then analyze these case studies via system dynamics, agent-based, social network, and game theory modeling paradigms. This course is designed to develop empirical research skills, conceptual modeling expertise, and model construction. Students will understand how to analyze, verify, and validate a model.

MSIM 774. Transportation Network Equilibrium, 3 Credits.
This course provides a rigorous introduction to transportation network modeling, with special emphasis on network equilibrium problems. Topics include: elementary graph theory, shortest path problem nonlinear optimization, optimization of univariate functions, deterministic and stochastic user equilibrium.

MSIM 776. Simulation Modeling in Transportation Networks, 3 Credits.
Principles of simulation modeling, microscopic, mesoscopic, and macroscopic traffic simulation models. Course explores diver behavior in networks, calibration and validation of traffic simulation models, and use of traffic simulation software.

MSIM 795. Topics in Modeling and Simulation, 3 Credits.
Special topics of interest with emphasis placed on recent developments in modeling and simulation.

MSIM 797. Independent Study in Modeling and Simulation, 3 Credits.
Individual study selected by the student. Supervised and approved by a faculty member with the approval of the graduate program director. Prerequisites: permission of instructor or graduate program director.

MSIM 802. Methods of Rational Decision Making, 3 Credits.
Covers advanced methods in Operation Research and Optimization. Focus will be on developing models and their application in different domains including manufacturing and services. (Cross listed with ENMA 702/ENMA 802).

MSIM 811. Finite Element Analysis, 3 Credits.
Prerequisites: permission of the instructor. The purpose of the course is to provide an understanding of the finite element method (FEM) as derived from an integral formulation perspective. The course will demonstrate the solutions of (1-D and 2-D) continuum mechanics problems such as solid mechanics, fluid mechanics and heat transfer.

MSIM 822. Cluster Parallel Computing, 3 Credits.
This course provides detailed numerical step-by-step procedures to exploit parallel and sparse computation under MPI (Message, Passing, Interface) computer environments. Large-scale engineering/science applications are emphasized. Simultaneous linear equations are discussed.

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The focus of the course is on identification and investigation of mathematical and logical structures that form the foundation for computational simulation. Topics include: foundations of simulation theory in logic, discrete mathematics, and computability; simulation formalisms, including DEVVS; interoperability protocols; and computational complexity. Prerequisites: MSIM 601 or equivalent.

MSIM 841. Principles of Visualization, 3 Credits.
Well-designed graphical media capitalizes on human facilities for processing visual information and thereby improves comprehension, memory, inference, and decision making. This course teaches techniques and algorithms for creating effective visualizations based on principles and techniques from graphic design, visual art, perceptual psychology and cognitive science. Both users and developers of visualization tools and systems will benefit from this course.

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MSIM 892. Doctor of Engineering Project, 1-9 Credits.
Directed individual study applying advanced level technical knowledge to identify, formulate and solve a complex, novel problem in Modeling and Simulation.

MSIM 895. Topics in Modeling and Simulation, 3 Credits.
Special topics of interest with emphasis placed on recent developments in modeling and simulation.

MSIM 897. Independent Study in Modeling and Simulation, 1-3 Credits.
Individual study selected by the student. Supervised and approved by a faculty member with the approval of the graduate program director. Prerequisites: permission of the instructor or graduate program director.
MUSIC 592. Music in the Classical Era. 3 Credits.
A study of music history from the Rococo Period through the works of Haydn, Mozart and Beethoven. A discussion of musical style within the context of cultural history. (fall semesters, odd years).

MUSIC 594. Music in the Romantic Era. 3 Credits.
A study of music history from the late works of Beethoven to Mahler and Strauss. A discussion of musical style within the context of cultural history. (offered spring, even years).

MUSIC 595. Topics in Music. 1-3 Credits.
These courses will appear in the course schedule. Course descriptions and prerequisites for each course may be found in information distributed to all academic advisors.

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MUSC 610. Orff Schulwerk Level III. 3 Credits.
This course will build upon the skills and concepts introduced in Orff Schulwerk Levels I and II. Recorder technique will be expanded upon as well as eurhythmics and special topics. Prerequisites: MUSC 607 and MUSC 608.

MUSC 611. Current Trends in Elementary and Secondary Music. 3 Credits.
Designed for public school music teachers. This course involves the study of current methodology, its practice and uses in the elementary and secondary general/vocal/instrumental music program. Prerequisites: Baccalaureate degree in music or permission of the department chair and instructor.

MUSC 612. Organization and Administration of Instrumental Music. 3 Credits.
The course involves the study of effective organization and implementation techniques for elementary and secondary instrumental ensembles; includes particular problems in the administration of high school instrumental groups. Prerequisites: Baccalaureate degree in music or permission of instructor.

MUSC 613. Workshop in Music Education. 1 Credit.
This course centers upon the development of performance and instructional skills in various aspects of music education. May be repeated twice with different emphases. Prerequisites: Baccalaureate degree in music or permission of the department chair and instructor.

MUSC 614. Workshop in Instrumental Music. 1 Credit.
The course centers upon the development of performance and instrumental skills in various aspects of instrumental music. May be repeated twice with different emphases. Prerequisites: Baccalaureate degree in music or permission of the department chair and instructor.

MUSC 615. Workshop in Choral Music. 1 Credit.
This course centers upon the development of conducting techniques, performance and instructional skills in various aspects of choral music. May be repeated twice with different emphases. Prerequisites: Baccalaureate degree in music or permission of the department chair and instructor.

MUSC 616. Advanced Conducting Seminar. 3 Credits.
Involves conducting techniques as applied to various mixed ensembles. Emphasizes the technical considerations common to all phases of choral and instrumental conducting with special concern for school problems. Prerequisites: Baccalaureate degree in music or permission of instructor or department chair.

MUSC 623. Arranging for Instrumental Ensembles. 3 Credits.
A course focused upon the arranging of music for instrumental ensembles from trio, quartet, quintet, etc., to full band or orchestra. Techniques will be discussed in class and students will complete written assignments to implement these techniques. Final paper will be an arrangement for an ensemble of at least six parts. Prerequisites: passing the graduate theory placement test; undergraduate degree in music or permission of the instructor.

MUSC 630. Research in Music Education. 3 Credits.
Types of research, selection of problems, location of educational information, collection and classification of data, organization, presentation and interpretation of materials in the area of music education. Prerequisites: undergraduate degree in music or permission of the instructor. Pre- or corequisite: MUSC 600.

MUSC 635. The Use of Computers and Midi Technology in the Classroom. 3 Credits.
An in-depth survey of software available for use in the classroom, including sequencing, notation, and theoretical applications. A basic understanding of synthesizers and MIDI technology will be emphasized. The course will focus upon a hands-on approach to the subject matter, and extensive laboratory time in the EMS will be required. Prerequisites: undergraduate degree in music or permission of the instructor.

MUSC 636. Techniques of Jazz Education in the Secondary School. 3 Credits.
This course will deal with rehearsal techniques for the Jazz Ensemble, including articulation, style, phrasing, literature, and improvisational techniques. In addition, Jazz history and literature will be discussed in detail. Prerequisites: undergraduate degree in music or permission of the instructor.

MUSC 639. Vocal/Choral Arranging. 3 Credits.
Course is designed to develop the skills necessary to arrange a piece of vocal music for ensembles of various sizes and makeup. Techniques will be discussed and shown in class and students will complete written assignments to implement these techniques. Prerequisites: passing the Theory Placement Test; undergraduate degree in music or permission of the instructor.

MUSC 680. Performing Ensembles. 1 Credit.
Students are expected to help with sectional rehearsals and do in-depth score study on all music being performed. Prerequisites: permission of the instructor and audition.

MUSC 691. Tests and Measurement in Music Education. 3 Credits.
This course is designed to acquaint the student with tests and measurements used in the field of music education and the methods of designing and utilizing such tests. Prerequisites: Baccalaureate degree in music or permission of the department chair and instructor.

MUSC 695. Topics in Music. 1-3 Credits.
These courses will appear in the course schedule. Course descriptions and prerequisites for each course may be found in information distributed to all academic advisors. Prerequisites: undergraduate degree in music or permission of the instructor.

MUSC 696. Topics in Music. 1-3 Credits.
These courses will appear in the course schedule. Course descriptions and prerequisites for each course may be found in information distributed to all academic advisors. Prerequisites: undergraduate degree in music or permission of the instructor.

MUSC 697. Independent Study. 1-3 Credits.
Designed for individualized study. Independent study projects will be related to music education and done under the supervision of a certified faculty member. Prerequisites: permission of the graduate program director.

MUSC 698. Thesis Research. 3 Credits.
Prerequisites: MUSC 600, MUSC 630 and permission of the graduate program director. Application of research procedures in music education, culminating in student study of selected topics.

MUSC 699. Thesis. 3 Credits.
Prerequisites: MUSC 698. Completion of thesis for MME degree.

MUSC 999. Music 999. 1 Credit.
Course for continuation in the master’s program for MME.

NMED - Nuclear Medicine Technology

NUCLEAR MEDICINE TECHNOLOGY Courses

NMED 695. Topics in Nuclear Medicine Technology. 1-3 Credits.
Special topic related to the field of nuclear medicine technology and molecular imaging.

NMED 697. Directed Study in Nuclear Medicine Technology. 1-3 Credits.
Directed study in a topic or area relevant to nuclear medicine or nuclear medicine technology.

NMED 698. Research. 3 Credits.
Research on a topic or project related to nuclear medicine or nuclear medicine technology.

NMED 699. Thesis. 3 Credits.
Thesis on a topic in nuclear medicine/molecular imaging or nuclear medicine technology.
NURA - Nurse Anesthesia

NURSING Courses

NURS 595. Topics in Nursing. 1-3 Credits.
The study of selected topics that may not be offered regularly. Special topics will appear in the schedule of classes each semester. Prerequisites: Permission of the instructor.

NURS 610. Theoretical Foundations for Nursing Practice. 3 Credits.
This course focuses on development of advanced knowledge of nursing and non-nursing models, concepts, and theories as the supporting framework for professional nursing practice and research. Emphasis is placed on both analysis and application of the models, concepts, and theories to various client populations and nursing practice settings. Students are expected to support conclusions regarding a theory’s utility to practice through presentation of supportive research findings.

NURS 611. Research Design. 3 Credits.
This research course is designed to provide the MSN student with knowledge needed to critique research literature. Research design and methodology components are also presented.

NURS 613. Issues in Advanced Nursing Practice. 3 Credits.
This course focuses on political, ethical, societal, and professional issues in advanced nursing practice. The student examines current and emerging advanced practice roles including entrepreneurship. Prerequisites: NURS 610, NURS 611.

NURS 615. Ethics of Advanced Practice Nursing. 2 Credits.
This course is designed to provide the MSN student with essential core knowledge regarding the ethics of advanced practice nursing.

NURS 616. Organizational Leadership: Transformational Strategies in Focus Area. 2 Credits.
This practicum is the first of a series of clinical courses that provide opportunities for advanced nursing practice in a variety of settings and with diverse clients. In addition, the student examines issues related to the advanced practice role in a chosen focus area. This course is designed to provide the student with experience in application of theories and assessment tools explored in Organizational Leadership. Prerequisites: admission to the program.
NURS 617. Strategic Leadership: Transformational Strategies in Focus Area. 2 Credits.
This practicum course emphasizes the advanced practice nurse’s role in strategic planning and program development. Students enrolled in this advanced practice course, the second of a series of three, will continue clinical practice experiences in a chosen focus area. Prerequisites: NURS 616.

NURS 618. Visionary Leadership: Transformational Strategies in Focus Area. 2 Credits.
This practicum course is the culminating course in a series of courses that target clinical experiences for the advanced practice nurse. The practicum emphasizes the advanced practice nurse’s role in the implementation of change, meeting strategic initiatives, program evaluation, and outcome management in a chosen focus area. Application of futuristic and visionary theory to health care system trends is explored to provide optimal strategic positioning in future health care markets. Prerequisites: NURS 617.

NURS 619. Advanced Nursing Practice IV. 6 Credits.
This clinical course provides an opportunity for concentrated clinical practice in the advanced nursing practice role. Prerequisites: NURS 674 and NURS 675.

NURS 620. Professional Relationships and Human Resources Management. 3 Credits.
This course focuses on the constructive use of power, influence and politics impacting nursing and the health care system. Theories of group dynamics, motivation and incentives will be used to underpin skill development in negotiation and conflict resolution. Prerequisites: admission to program or approval of instructor.

NURS 621. Aging in the 21st Century. 3 Credits.
Prerequisites: NURS 610, NURS 611, NURS 670, NURS 671, NURS 672, NURS 661. This course explains the history of the specialty of geriatrics, the social impact, health maintenance goals and physical changes associated with aging. The role of interprofessional teams in meeting the needs of the aging population will be explored. It is designed to complement other topics taught in the graduate program.

NURS 630. Nursing Curriculum Design and Program Evaluation. 3 Credits.
Prerequisites: NURS 632 and NURS 634. This course focuses on assessment and evaluation strategies to judge learner performance, as well as course and program effectiveness. Issues related to nursing program design and evaluation for entry level nursing programs are explored.

NURS 632. Instructional Delivery Methods and Learner Assessment. 3 Credits.
This course describes models and methods for clinical instruction that facilitate learning, and explores clinical evaluation methods and instruments. Emphasis is on identifying ways to blend traditional teaching strategies with technology-based instruction in classroom and clinical settings.

NURS 634. Nurse Educator/Faculty Internship I Classroom Instruction. 2 Credits.
This internship course is designed to provide the student with experience facilitating classroom instruction in an entry level nursing program. Prerequisite: NURS 632.

NURS 636. Instructional Delivery Methods in Nursing Education. 3 Credits.
The enhancement of nursing education through technology-based instruction utilizing a variety of resources and models is explored. Reports of best practices, research findings and learning-related theories to guide the development of media-supported instruction, skill acquisition in a simulated environment, and the creation and nurturing of learning communities in cyberspace are examined. Corequisite: NURS 634.

NURS 638. Adult-Gerontology Clinical Nurse Specialist I: Introduction to Practice. 2 Credits.
This course provides the MSN student with knowledge of core concepts that provide the foundation for Adult/Gerontology Clinical Nurse Specialist practice. Corequisite: NURS 639. Prerequisites: NURS 610, NURS 611, NURS 670, NURS 671, NURS 672, NURS 661.

NURS 639. Adult-Gerontology Clinical Nurse Specialist Practicum I: Role Socialization. 3 Credits.
Prerequisites: NURS 610, NURS 611, NURS 661, NURS 670, NURS 671, and NURS 672. This course is designed to acquaint the student with the role of the Adult-Gerontology Clinical Nurse Specialist in the practice environment.

NURS 642. Advanced Maternal Child Nursing II: Common Health Problems and Health Promotion of Children. 3 Credits.
This course provides knowledge and skills needed to promote and nurture the health of children from neonates to adolescents. The management of common health problems is also a focus.

NURS 644. Clinical Teaching Methods for the Nurse Educator. 2 Credits.
This course describes practice settings for nursing clinical instruction, identifies characteristics of effective clinical teachers, describes models and methods for clinical instruction that facilitate learning, and explores clinical evaluation methods and instruments. Corequisite: NURS 649. Prerequisites: NURS 634 and NURS 636.

NURS 645. Nursing Curriculum Design and Course Development. 3 Credits.
Factors that influence the development of entry-level nursing curricula are explored in relation to workforce trends and accreditation standards and guidelines. The importance of a philosophical and theoretical foundation for nursing education is highlighted in relation to the development of a curricular framework that identifies instructional competencies and uses to guide course design and determine course content and sequencing. Corequisite: NURS 649. Prerequisites: NURS 634 and NURS 636.

NURS 646. Structure and Function for Advanced Nursing Practice I. 3 Credits.
This course is designed to provide indepth knowledge of structure and function of the human body as the necessary basis for the advanced practice of nursing. The course emphasizes analysis and application of the structure and function of the nervous, endocrine, and excretory systems to advanced practice nursing. Prerequisites: admission to the program.

NURS 647. Structure and Function for Advanced Nursing Practice II. 3 Credits.
This course is designed to provide indepth knowledge of structure and function of the human body as the necessary basis for the advanced practice of nursing. The course emphasizes the analysis and application of the structure and function of the cardiovascular and respiratory systems to the advanced practice of nursing. Prerequisites: NURS 646.

NURS 648. Disease Processes for Advanced Practice. 3 Credits.
This course examines topics in selected disease processes. The course focuses on the significance of the disease for advanced nursing practice. Prerequisites: NURS 646 and NURS 647.

NURS 649. Nurse Educator/Faculty Internship II Clinical Instruction. 2 Credits.
This practicum course is designed to provide the student with field experience in clinical instruction. A nursing master teacher in an entry-level nursing education program mentors the student. Students consult with the role coordinator to select a site for the completion of this experience. Prerequisites: NURS 634 and NURS 636.

NURS 654. Assessment and Evaluation in Nursing Education. 3 Credits.
This course concentrates on strategies to measure and improve nursing student performance in the classroom, as well as enhance course and program effectiveness. Emphasis is on the selection of instruments, data collection methods and reporting procedures to guide assessment and evaluation processes that are appropriate for what is being examined. Corequisite: NURS 676. Prerequisites: NURS 634, NURS 636, NURS 644, NURS 645, and NURS 649.
NURS 656. Adult-Gerontology Clinical Nurse Specialist II: Transition to Practice. 2 Credits.
This course provides the MSN student with knowledge necessary for developing Adult-Gerontology Clinical Nurse Specialist practice and leadership skills. Corequisite: NURS 657. Prerequisites: NURS 610, NURS 611, NURS 670, NURS 671, NURS 672, NURS 661, NURS 638, NURS 639.

NURS 657. Adult-Gerontology Clinical Nurse Specialist Practicum II: Role Transition. 3 Credits.
This clinical course focuses on Adult-Gerontology Clinical Nurse Specialist practice. Concepts presented in the didactic component (NURS 656) will be actualized in the clinical setting. Pre- or corequisite: NURS 656.

NURS 658. Advanced Nursing Practice in Women’s Health I. 2 Credits.
This course focuses on the development of advanced practice skills in the care of women. Prerequisites: NURS 661, NURS 670, NURS 671, NURS 672, and NURS 719.

NURS 659. Advanced Nursing Practice in Women’s Health II. 3 Credits.
Prerequisites: NURS 610, NURS 611, NURS 658, NURS 661, NURS 663, NURS 664, NURS 670, NURS 671, NURS 672, NURS 719, and NURS 762. This course focuses on the development of advanced skills related to perinatal practice in the care of women.

NURS 660. Advanced Nursing Practice in Women’s Health III. 6 Credits.
This course focuses on the integration of advanced practice skills in the care of women including health promotion, illness management, reproductive needs, and lifespan care. Corequisite: NURS 686. Prerequisites: NURS 658, NURS 659, NURS 661, NURS 663, NURS 664, NURS 670, NURS 671, NURS 672, NURS 719, NURS 762, and NURS 787.

NURS 661. Pharmacotherapeutics for Primary Health Care Providers. 3 Credits.
This course is designed to expand the graduate nurse practitioner or clinical nurse specialist student’s understanding of pharmacological principles, including pharmacokinetics and pharmacodynamics.

NURS 663. Health Promotion and Maintenance. 2 Credits.
This course provides the nurse practitioner student the opportunity to work with clients from other professions as they develop health promotion strategies that consider the expertise of each discipline. Students will incorporate technology in promoting health. Corequisite: NURS 611. Prerequisites: NURS 610 and NURS 719.

NURS 664. Primary Care for Women. 3 Credits.
This course will explore current clinical concepts related to the care of healthy and pregnant women. Roles and responsibilities of the family nurse practitioner in these subspecialties will be discussed. Corequisite: NURS 663. Prerequisites: NURS 661, NURS 670, NURS 671, NURS 672, and NURS 719.

NURS 665. Advanced Family Nursing I Practicum. 2 Credits.
This course provides the opportunity to practice clinical decision making and primary care assessment skills within a primary care setting. Collaborative strategies will be emphasized in the position of health promotion/maintenance strategies and the management of common health problems. Prerequisites: NURS 661, NURS 670, NURS 671, NURS 672, and NURS 719.

NURS 670. Advanced Pathophysiology. 3 Credits.
This course explains the pathophysiology of disease as a basis for advanced practice and assessment for prevention and management of health conditions.

NURS 671. Advanced Physical Assessment. 1 Credit.
Emphasis is on advanced history taking, physical assessment and interviewing skills for advanced practice nursing. Pre- or corequisite: NURS 672.

NURS 672. Advanced Physical Assessment Laboratory. 1 Credit. Laboratory 3 hours; 1 credit. Corequisites: NURS 670 and 671. This laboratory course provides the advanced practice student a hands-on opportunity to practice physical assessment skills needed by nurse practitioners.

NURS 674. Advanced Maternal Child Nursing Practice II. 2 Credits. Continued advanced practice nursing in the care of children and their families. Prerequisites: NURS 661, NURS 670, NURS 671, NURS 672.

NURS 675. Advanced Maternal Child Nursing Practice III. 2 Credits.
Capstone clinical course in advanced practice nursing in the care of children and their families. Corequisite: NURS 724. Prerequisites: NURS 674.

NURS 676. Professional, Ethical and Legal Concepts of Nursing Education. 3 Credits.
This course is designed to prepare students for the role of educator in higher education environments. Emphasis is on the identification of functions, rights, and responsibilities of nursing faculty in relation to students, colleagues, administrators, the institution, community, and profession. Corequisite: NURS 654. Prerequisites: NURS 634, NURS 636, NURS 644, NURS 645 and NURS 649.

NURS 686. Synthesis of Advanced Practice Concepts in Adolescent Focus. 3 Credits.
This capstone course focuses on the synthesis of advanced practice concepts in the care of adolescent females. Content includes successful models of care and models of collaborative practice in pediatrics. Prerequisites: NURS 661.

NURS 690. M.S.N. Comprehensive Examination. 0 Credits.
The Master of Science in Nursing comprehensive examination offers the student an opportunity to synthesize the learning experiences of the graduate program and demonstrate mastery of program outcomes in critical thinking, advocacy, leadership, advance practice, and education. The student must receive a grade of pass on the comprehensive examination to successfully complete the M.S.N. degree.

NURS 695. SU Nursing. 6 Credits.
Selected courses taken at Shenandoah University in fulfillment of Midwifery program requirements. Course title offerings as Primary Care of Women or Comprehensive Antepartal Care.

NURS 697. Topics: Independent Study. 1-3 Credits. Independent Study.

NURS 698. Independent Clinical Study. 1-3 Credits.
This course focuses on clinical and/or research-related competencies of graduate nursing students. Students enroll on an as-needed basis as determined by the instructor or student. Prerequisites: enrollment in the graduate nursing program and permission of the instructor.

NURS 699. Thesis/Research Project. 1-3 Credits.
Thesis/research project completion. Variable credit to be determined by research advisor. May be repeated as needed. Prerequisites: NURS 611, NURS 640.

NURS 703. Adult-Gerontology Clinical Nurse Specialist Practicum III: Role Synthesis. 3 Credits.
This capstone course focuses on synthesis and application of key concepts related to Adult-Gerontology Clinical Nurse Specialist and Educator practice. Prerequisites: NURS 610, NURS 611, NURS 670, NURS 671, NURS 672, NURS 661, NURS 638, NURS 639, NURS 656, and NURS 657.

NURS 705. Primary Care Approaches for Children. 3 Credits.
This course for the family nurse practitioner focuses upon primary health care problems in the pediatric population. Emphasis is placed upon assessment and management of healthy and ill children. Corequisite: NURS 764. Prerequisites: NURS 661, NURS 663, NURS 664, NURS 665, NURS 670, NURS 671, NURS 672, and NURS 762.

NURS 707. Informatics/Database Management. 3 Credits.
This course will cover the use of data in health care as well as other informatics applications.
NURS 710. Leadership in Complex Systems and Organizations. 3 Credits.
This course will focus on the leadership that comprises two types: informal and formal leadership. Competencies will include communication knowledge of health care environment, leadership, professionalism, and business skills.

NURS 712. Evidence Based Management for Quality Healthcare. 3 Credits.
This course focuses on the development of systems focus processes to ensure quality health care. The evidence based model is applied to organizational systems.

NURS 714. Competitive Resource Design and Utilization. 3 Credits.
Prerequisites: NURS 800, 810. This course focuses on the competitive design and utilization of organizational and human resources. Emphasis is placed on the strategic process to ensure that resources are applied in ways to ensure high quality care and excellent patient outcomes. The course will cover the business models for effective financial and personnel management of healthcare organizations. Analysis of the costs of care and quality of care will be performed.

NURS 719. Family and Community Primary Care Assessment. 1 Credit.
Focus is on assessing psycho-social problems in primary care setting. Student will develop skills in assessing the most common psychiatric disorders, substance abuse and disruptive behavior disorders. Assessment of the patient in the context of the family will be stressed. Prerequisites: admission to the FNP, WHNP or Postmaster’s FNP and WHNP program.

NURS 724. Management of Chronic Problems and Illnesses. 3 Credits.
The focus on this course is on the management of chronic and acute illness in children.

NURS 732. Health Care Populations, Diversity and Outcomes. 3 Credits.
This course examines current topics and issues related to health disparities in underserved populations. Students will examine intervention and policy research using an interdisciplinary perspective as well as the structural, financial and personal barriers to optimal health outcomes.

NURS 735. Organizational Leadership. 3 Credits.
This course provides a theoretical foundation and focuses on leadership theory and assessment strategies for use in the health care system. Theories on leadership, organizations, policy, administration, and change will be applied to current health care system issues. Assessment tools for applications of theories will be utilized. Principles of organizational behavior and human resource management will be explored in the context of health care system needs. Prerequisites: Admission to program or approval of instructor.

NURS 740. Strategic Leadership. 3 Credits.
Principles of organizational strategy and program development are the major components for this course. Relevant theories associated with organizational development, setting program strategic initiatives, strategic planning, and organizational level analysis and evaluation will be explored. Prerequisites: admission to program, NURS 735, or approval of instructor.

NURS 745. Visionary Leadership. 3 Credits.
The final course in the leadership series provides the opportunity to examine outcomes at the program and health care system level and project future health care system needs. The focus is on activities necessary for effective evaluation of health care programs and meeting strategic initiatives by successfully implementing change. Capability for envisioning profound changes within the health care system will be developed. Transformation/Futuristic theory will be applied to envision market change for health care systems to be strategically positioned for future trends. Prerequisites: NURS 735, NURS 740, admission to program or approval of instructor.

NURS 762. Advanced Family Nursing I: Management of Acute Illnesses. 3 Credits.
Focus is on acute health problems in the primary care setting, including assessment and management. Inclusion of geriatric content relating to acute illnesses will be added. Prerequisites: NURS 661, NURS 670, NURS 671, NURS 672, and NURS 719.

NURS 764. Advanced Family Nursing II Practicum. 4 Credits.
The purpose of this clinical course is to prepare the family nurse practitioner student to deliver primary care services to families in which a patient has either acute, women’s health or pediatric care disorders. Corequisite: NURS 705. Prerequisites: NURS 661, NURS 663, NURS 664, NURS 665, NURS 670, NURS 671, NURS 672, NURS 719, and NURS 762.

NURS 765. Advanced Family Nursing II: Management of Chronic Illnesses. 3 Credits.
The focus of this course is on the accurate diagnosis and management of chronic health problems within the primary care setting for the family nurse practitioner (FNP). Prerequisites: NURS 661, NURS 663, NURS 664, NURS 665, NURS 667, NURS 670, NURS 671, NURS 672, NURS 705, NURS 719, NURS 762, and NURS 764. Pre- or corequisite: NURS 765 and NURS 768.

NURS 767. Advanced Family Nursing III Practicum. 5 Credits.
This clinical emphasizes integration of primary care skills and clinical course decision-making in populations with acute chronic, complex, pediatric or women's health disorders for family nurse practitioner students. Prerequisites: NURS 661, NURS 663, NURS 664, NURS 665, NURS 670, NURS 671, NURS 672, NURS 705, NURS 719, NURS 762, and NURS 764.

NURS 768. Nursing Seminar in Complex Health Problems. 1 Credit.
The focus of this seminar course is to explore clinical topics with an emphasis on the integration of primary care skills in advanced nursing practice. Prerequisites: NURS 613, NURS 705, and NURS 764.

NURS 780. Financial Issues in Nursing Administration. 3 Credits.
This course focuses on planning, designing, and monitoring of a nursing budget with special emphasis on personnel, supply, and capital equipment budgeting. Specific financial problems of a nursing service department are addressed. Prerequisites: NURS 616 and NURS 735.

NURS 787. Advanced Perinatal Nursing. 3 Credits.
This course focuses on the advanced nursing management of perinatal health for high-risk women. Prerequisites: NURS 658, NURS 661, NURS 663, NURS 664, NURS 670, NURS 671, NURS 672, NURS 719, and NURS 762.

NURS 795. Topics. 3 Credits.
Prerequisites: Ph.D. standing or permission of the instructor. Designed to provide the advanced student with an opportunity to investigate specific topics of current interest in the health services.

NURS 800. DNP Integrative Concepts I. 2 Credits.
This course focuses on four DNP integrative concepts including leadership, advocacy, practice, and translational research. Issues related to planning and providing care for vulnerable and underserved populations will be highlighted. The role of epidemiology will be explored.

NURS 801. DNP Integrative Concepts II. 3 Credits.
This course focuses on role expectations for doctoral-prepared advanced practice nurses; the intersection of models of leadership, advocacy, practice and translational research will be emphasized.

NURS 802. The Business of Advanced Nursing Practice. 3 Credits.
This course will explore the business dimensions of practice including legal, safety, quality and financial. The course will focus on SWOT analysis, developing business plans and community assessments.

NURS 803. Leadership/Management in Healthcare. 3 Credits.
This course explores organizational and structural opportunities and barriers within healthcare organizations. The focus is on the role of the advanced practice nurse as a leader and manager within healthcare organizations. Emphasis is on meeting the healthcare needs of underserved populations.

NURS 805. Clinical Research Methods. 2 Credits.
This course focuses on the research process used to conduct practice-based research. It prepares advanced practice nurses to develop, implement, and evaluate programs that focus on improving healthcare outcomes.
NURS 806. Practice-Based Research/Evaluation. 4 Credits.
Prerequisites: NURS 800, NURS 802. This research course is designed to provide the Advanced Practice Nurse with knowledge and skills regarding the design and methodology used to conduct a practice focused research study. Focus will be on human subjects protection, statistical analysis and database management.

NURS 807. Informatics/Database Management. 3 Credits.
This course will cover the use of data in health care as well as other informatics applications. Students will explore healthcare technology used to improve the delivery and evaluation of care.

NURS 809. Health Care Planning and Policy for Advanced Practice. 3 Credits.
This course will prepare the DNP to assume a leadership role in developing, implementing, and advocating for health care policy that results in quality, accessible, comprehensive health care for vulnerable populations.

NURS 810. Leadership in Complex Systems and Organizations. 3 Credits.
This course will focus on the leadership that comprises two types: informal and formal leadership. Competencies will include communication, knowledge of health care environment, leadership, professionalism, and business skills.

NURS 812. Evidence Based Management for Quality Healthcare. 3 Credits.
Prerequisites: NURS 810. This course focuses on the development of system focused processes to ensure quality healthcare. The evidenced based model is applied to organizational systems. Emphasis is placed on creative and innovative solutions to quality care issues.

NURS 814. Competitive Resource Design and Utilization. 3 Credits.
Prerequisites: NURS 800, NURS 810. This course focuses on the competitive design and utilization of organizational and human resources. Emphasis is placed on the strategic process to ensure that resources are applied in ways to ensure high quality care and excellent patient outcomes. The course will cover the business models for effective financial and personnel management of healthcare organizations. Analysis of the costs of care and quality of care will be performed.

NURS 816. Nursing Executive Leadership I. 1-3 Credits.
Prerequisites: NURS 800. This experience focuses on the application of executive leadership skills in nursing.

NURS 817. Nursing Executive Leadership II. 3-5 Credits.
Prerequisites: NURS 804 and NURS 816. This experience focuses on the application of executive leadership skills in nursing.

NURS 818. Nursing Executive Leadership III. 3-5 Credits.
Prerequisites: NURS 800, NURS 816, and NURS 817. This experience focuses on the application of executive leadership skills in nursing.

NURS 819. Nursing Executive Leadership IV. 3-5 Credits.
Prerequisites: NURS 800, NURS 816, NURS 817, and NURS 818. Application of Nurse Executive Role in the practice setting.

NURS 865. Clinical Practicum I. 2 Credits.
This course is designed to provide the Advanced Practice Nurse with the knowledge and skills to practice at an advanced level in a practice-based setting. Focus will be on enhanced clinical skills and evidence-based research. Corequisite: NURS 805.

NURS 866. Clinical Practicum II. 2 Credits.
This course is designed to provide the Advanced Practice Nurse with the knowledge and skills to practice at an expert clinician, a program evaluator, and a team leader within a practice-based setting focusing on evidence-based practice. Corequisite: NURS 807. Prerequisites: NURS 800, NURS 801, NURS 802, NURS 803, and NURS 806.

NURS 868. Clinical Practicum IV. 3 Credits.
This course is designed to provide the Advanced Practice Nurse with the knowledge and skills to practice as an expert clinician, a program evaluator, a team leader, and a change agent with emphasis on translational and evidence-based research. Corequisite: NURS 890. Prerequisites: NURS 800, NURS 801, NURS 802, NURS 803, NURS 806, and NURS 807.

NURS 890. Nursing Capstone. 3 Credits.
This research course is designed to facilitate the ability of the Advanced Practice Nurse to synthesize, translate into practice, and disseminate practice focused research findings and apply findings to practice settings.

NURS 895. Topics. 1-3 Credits.
Prerequisites: Ph.D. standing or permission of the instructor. Designed to provide the advanced doctoral student with an opportunity to investigate specific topics of current interest in the health services.

OEAS - Ocean, Earth & Atmospheric Sci

OCEAN, EARTH ATMOSPHERIC SCI Courses

OEAS 502. Field Experiences in Oceanography for Teachers. 3 Credits.
Lecture 2 hours; field experience 2 hours; 3 credits. Prerequisite: background in K-12 Education. Field and laboratory experiences in oceanography including hands-on experience using equipment and methods suitable for middle and secondary education professionals. Course will provide understanding of oceanic processes using simple field and laboratory experiments. Not available for credit for OEAS majors and minors.

OEAS 503. Aquatic Pollution. 3 Credits.
Lecture 3 hours; 3 credits. This course will present basic ecological principles relevant to water pollution and toxicology. Topics will cover runoff, eutrophication, sewage treatment, industrial waste, oil pollution, pesticides, and plastics in the sea. Case studies provide focal points for consideration of issues in making decisions and setting policy. (This is a writing intensive course.)

OEAS 504. Environmental Physiology of Marine Animals. 3 Credits.
Lecture 3 hours; 3 credits. Functional morphology and physiological aspects of growth and ecological energetics of marine animals. Basic concepts and habitat comparisons.

OEAS 505. Physical Oceanography. 3 Credits.
Physics of the ocean: properties of seawater and their distribution; water mass formation; mass and energy flows; waves; tides; models; estuarine and coastal processes. An elective for science and engineering majors. Prerequisites: C or better in MATH 211 and either PHYS 232N or two semesters of hydraulics.

OEAS 506. Matlab. 1 Credit.
This course is designed to introduce students to Matlab programming and to develop skills utilizing this program for data analysis. Prerequisite: C or better in MATH 211 or permission of instructor.

OEAS 508. Introductory Soils. 4 Credits.
Lecture 3 hours; laboratory 2 hours; 4 credits. Nature and properties of soils. Physical and chemical processes in soils and their influence on plant growth, the movement of water, and pollutants. Importance of soil properties in determining urban, industrial and agricultural uses.

OEAS 510. Chemical Oceanography. 4 Credits.
Lecture 3 hours; laboratory 3 hours; 4 credits. Chemical composition of the ocean and the chemical, biological, geological and physical processes controlling it. Laboratory experiments include determination of salinity, oxygen, and nutrients, and a field sampling trip is undertaken.

OEAS 511. Structural Geology. 4 Credits.
Lecture 3 hours; laboratory 2 hours; 4 credits. Recognition, habitat, and origin of deformed geologic structures. Relationships between structural patterns and tectonic settings. Laboratory sessions emphasize cartographic and stereographic projections, map interpretation, and hand sample evaluation. Weekend field trip required.
OEAS 512. Global Environmental Change. 3 Credits.
Lecture 3 hours; 3 credits. An examination of the development of the earth as a habitable planet, from its origin to human impacts on global biogeochemical cycles on land, and in the oceans and atmosphere.

OEAS 513. Environmental Geochemistry. 3 Credits.
Low temperature geochemistry of surface and near-surface materials and processes. Weathering and the geochemical cycle as influenced by environment.

OEAS 515. Waves and Tides. 3 Credits.
Causes, nature, measurement and analysis of water waves and tides. Mathematical and graphical application to wave and tide problems.

OEAS 516. Electronics and Oceanographic Instrumentation. 4 Credits.
Lecture/Lab, 3 hours. 4 credits. The course will consist of brief lectures and hands-on laboratory exercises, in which students will learn to build, use, and debug electronic devices relevant to ocean and earth science applications. Topics covered will include circuit theory, power supplies and budgets, transducers and amplifiers, computerized data acquisition, instrument control, signal conditioning and resolution.

OEAS 518. Chemical Limnology. 3 Credits.
Lecture 3 hours; 3 credits. Chemical cycling in lakes and reservoirs, and interactions with biological and physical processes; quantitative modeling of lake geochemistry.

OEAS 519. Spatial Analysis of Coastal Environments. 3 Credits.
Lecture 1.5 hours; laboratory 3 hours; 3 credits. Prerequisite: GEOG 504. The course integrates remotely sensed and field techniques for scientific investigation and practical management of coastal environmental systems. Spatial modeling of coastal processes and management tools using geographic information system (GIS).

OEAS 520. Hydrogeology. 3 Credits.
Lecture 2 hours; laboratory 2 hours; 3 credits. Topics covered will include the occurrence and movement of surface and subsurface water, the nature and distribution of permeable rocks and strata, field techniques used in ground-water studies, and the flow of ground-water to wells.

OEAS 526. Concepts in Oceanography for Teachers. 3 Credits.
3 credits. This web-based course will provide a practical introduction to oceanography for earth science teachers. It is particularly aimed at current science teachers attempting to become certified in earth science education. Topics will include discussions of geological, biological, physical and chemical oceanography. Not available for credit for OEAS majors and minors.

OEAS 530. Introduction to Geophysics. 3 Credits.
Lecture 3 hours; 3 credits. Introduction to the physics of the earth, including plate tectonics, volcanism, earthquakes and seismology, gravity, the earth’s magnetic field, geophysical remote sensing, and mantle convection.

OEAS 531. Sedimentary Petrology. 3 Credits.
Lecture 2 hours; laboratory 3 hours; 3 credits. The chemical aspects of sediments and sedimentary rock needed for modern geologic and oceanographic studies. Optical petrology and x-ray diffraction are emphasized in the laboratory with particular attention to clay mineralogy. Field trip required.

OEAS 540. Biological Oceanography. 4 Credits.
Lecture 3 hours; laboratory 2 hours; 4 credits. Marine organisms and their relationship to physical and chemical processes in the ocean. Laboratory study of local marine organisms, marine ecosystem and sampling techniques. Includes identification, data analysis and field trips.

OEAS 546. Quaternary Geology. 3 Credits.
Lecture 3 hours; 3 credits. Geological effects of Cenozoic climate changes and tectonic movements on marine and terrestrial systems. Weekend field trips to study landscapes and deposits in the coastal plain and Appalachian provinces.

OEAS 548. Population Ecology. 3 Credits.
Lecture 3 hours; 3 credits. This course uses conceptual and mathematical models to understand how populations grow and persist in space and time. Both plants and animals are discussed.

OEAS 551. Data Collection and Analysis in Oceanography. 3 Credits.
Introduces basic physical oceanographic tools used to obtain and analyze information. Students will use various oceanographic instruments to obtain data at different locations in Chesapeake Bay. Data obtained with those instruments will be processed and analyzed using data analysis techniques discussed in class. The data will then be used to answer a particular question related to the temporal and spatial variability in a natural system.

OEAS 555. Introduction to Geomicrobiology. 3 Credits.
Lecture 3 hours; 3 credits. This course explores microorganisms in marine environments and their role in the fossil record. Students will examine bacteria and protista and investigate Earth’s history during the Precambrian. One field trip.

OEAS 595. Special Topics. 1-4 Credits.
Lectures, field and laboratory studies; 1-4 credits each semester. Prerequisites: permission of the instructor. An investigation of a selected problem in physical, geological, chemical, or biological oceanography.

OEAS 603. Geobiology and Biosedimentology. 3 Credits.
Lecture 3 hours; 3 credits. Geobiology and biosedimentology reflect the interdisciplinary approach to environmental problems, questions related to Earth history, and the exploration of extraterrestrial worlds. The course elaborates our understanding of geobiology and biosedimentology by conducting a study on benthic cyanobacteria and their influences on sedimentary processes in marine environments. Study area is Fisherman’s Island, located close to Norfolk, VA. The course includes aspects of astrobiology (the “sister of geobiology”), and discusses the evolution of life on Earth.

OEAS 604. Introduction to Physical Oceanography. 3 Credits.
Lecture 3 hours; 3 credits. Introduction to descriptive and dynamical physical oceanography. Properties of sea water; distribution of temperature, salinity and density; water, salt, and heat budgets; techniques for describing the ocean; circulation and water masses of the world’s oceans and coastal waters.

OEAS 605. Introduction to Ocean Modeling and Prediction. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: OEAS 505 or OEAS 604. Instructor approval required. Introduction to concepts and theories of numerical ocean models and their applications in physical oceanography, computational fluid dynamics, environmental problems and ocean forecast systems.

OEAS 606. Experimental Procedures in Physical Oceanography. 3 Credits.
Lecture 3 hours; 3 credits. Provides basic knowledge for conducting field experiments in physical oceanography. Fundamentals of experimental design and sampling theory. Standard methods of data reduction, analysis, and reporting.

OEAS 610. Advanced Chemical Oceanography. 3 Credits.
Lecture 3 hours; 3 credits. Chemical properties of seawater; chemical composition of the ocean including major and trace elements, dissolved gases, micronutrient elements, and organic compounds; processes controlling this composition.

OEAS 611. Chemical Oceanography Laboratory. 3 Credits.
Lecture 6 hours; 3 credits. Basic analytical chemistry of seawater; field work in chemical oceanography.

OEAS 612. Marine Geochemistry. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: OEAS 610. Processes governing the chemical composition of the ocean. Riverine input; air-sea exchange; sediment-bottom water exchange; hydrothermal input; internal cycling by physical processes; numerical modeling in chemical oceanography.

OEAS 613. Geochemistry of Marine Sediments. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: OEAS 610, 612. An introduction to the geochemistry of marine sediments, with an emphasis on nutrient (C,N,P,S) and trace element cycling in marine sediments.
OEAS 614. Chemical Oceanography in the Coastal Environment. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: OEAS 610. Chemical dynamics within water and sediments of estuaries, salt marshes, and the continental shelf; river-sea, air-sea, and sediment-water interactions; modeling techniques.

OEAS 616. Advanced Chemical Oceanography Laboratory. 3 Credits.
Lecture 1 hour; laboratory 6 hours; 3 credits. Prerequisite: OEAS 611. Analysis of trace constituents in marine waters, sediments, and sediment porewaters; sampling techniques; field experience.

OEAS 620. Advanced Geological Sciences. 3 Credits.
Lecture 3 hours; 3 credits. Survey of marine and terrestrial geology and geophysics; plate tectonics and basin formation; marine sediments and sediment dynamics; marine depositional environments and depositional systems; marine stratigraphy dynamics and the formation of marine basins.

OEAS 622. Wetland Hydrology. 3 Credits.
Lecture 2 hours; laboratory 3 hours; 3 credits. Hydrologic criteria used to delineate wetlands. Techniques used to calculate components of water budgets for non-tidal wetlands. Many lab exercises will require extensive field work in wetlands.

OEAS 625. Marine Sedimentary Environments. 3 Credits.
Attributes of marine sediments; main sedimentary facies zones in marine and coastal environments (deep sea, shelf, tidal flats, lagoons, barrier islands); modern depositional systems versus ancient depositional systems; reefs (brachiopoda, corals, sponges, foraminifers, etc); traces and trace fossils. Prerequisites: OEAS 620.

OEAS 630. Dynamical Oceanography I. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: OEAS 604 and MATH 691. Dynamics of rotating, stratified fluids, geostrophic adjustment, potential vorticity, Ekman layers, gravity waves, and large scale ocean circulation.

OEAS 634. Applied Clay Mineralogy. 3 Credits.
Lecture 3 hours; 3 credits. The study of clay minerals and colloids and the application of their physical and chemical properties to various geologic, agricultural, and environmental problems. Special emphasis is given to ion exchange and sorption problems involving clays under various conditions. Techniques of semiquantitative analysis of clay minerals and the alteration of their chemical physical properties are emphasized.

OEAS 637. Advanced Sedimentology. 3 Credits.

OEAS 639. Geological Oceanography Laboratory and Technique. 2 Credits.

OEAS 640. Advanced Biological Oceanography. 4 Credits.
Marine organisms and their interactions with the physical and chemical environments of the sea; primary production, population ecology, nutrition, reproduction, and marine biogeography; related laboratory exercises.

OEAS 644. Environmental Physiology of Marine Animals. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: OEAS 640 or equivalent. Physiological and biochemical adaptations of marine animals in stable and changing environments. Topics include foraging, respiration growth and reproductive strategies in diverse marine habitats.

OEAS 651. Introduction to Physics of Estuaries. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: OEAS 604. This course considers the physical oceanography of estuaries. In particular, it explores how circulation and mixing in estuaries are influenced by atmospheric forcing, tidal forcing, coastal influences and bathymetric variability. Topics to be treated include classification of estuaries, typical steady dynamical balances, transport of salt and other quantities, mixing, and time-space scales of variability.

OEAS 667. Cooperative Education. 1-3 Credits.
1-3 credits (may be repeated for credit). Prerequisite: approval by the department and Career Management in accordance with the policy for granting credit for Cooperative Education programs. Available for pass/fail grading only. Student participation for credit based on the academic relevance of the work experience, criteria, and evaluative procedures as formally determined by the department and Career Management prior to the semester in which the work experience is to take place.

OEAS 669. Internship in Oceanography. 1-3 Credits.
1-3 credits. Prerequisite: permission of the department.

OEAS 690. Topics in Marine Environmental Policy. 3 Credits.
Lecture 3 hours; 3 credits. This course will give students a working understanding of how science policy decisions are made by governments and how science and technology impact public policy. This course seeks to integrate current policy/legislative initiatives with the underlying scientific issues in order to raise the student’s appreciation for and understanding of the various influences that affect the decision-making process. In particular, the course will look at how science influences policy and assess the “state of the science” relative to the issues at stake.

OEAS 691. Seminar. 1 Credit.
1 credit. Techniques for presenting scientific data at professional meetings and seminars. Practical experience and feedback.

OEAS 695. Special Topics in Oceanography. 1-3 Credits.
1-3 credits each semester. An advanced investigation in a selected problem in physical, geological, chemical, or biological oceanography under the direction of the faculty of the Department of Ocean, Earth and Atmospheric Sciences.

OEAS 696. Selected Topics. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

OEAS 698. Research. 1-9 Credits.
Any semester; hours to be arranged; variable credit. 1-9 credits per semester. M.S.-level research.

OEAS 699. Thesis. 1-9 Credits.
Any semester; hours to be arranged; variable credit. 1-9 credits per semester. M.S.-level work primarily devoted to the writing of the thesis.

OEAS 703. Stability of Ocean Flow. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: calculus, differential equations, geo-physical fluid dynamics. A study of the basic ideas and methods used to examine the stability of ocean currents. Topics include fundamentals, barotropic and baroclinic instability, wave packets and energy balance.

OEAS 704. Time Series in Oceanography. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: calculus. A study of the basic techniques used to model and analyze time series of oceanographic data. These include temporal spatial and frequency/wave number domain techniques.

OEAS 708. Simulation Techniques for Ocean Circulation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: OEAS 730, and knowledge of a computer program language (FORTRAN preferred). Emphasis is on the construction of working ocean models, both vorticity-stream function and primitive equation models analyzed, mostly finite difference techniques, implicit and explicit schemes, staggered grids, discussion of ocean general circulation models.

OEAS 711. Regional Oceanography. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: OEAS 604. The regional oceanography of the major ocean basins, marginal seas, and coastal oceans. Seasonal and interannual variability. Heat and salt cycles.

OEAS 716. Aquatic Chemistry. 3 Credits.

OEAS 723. Ocean Turbulence and Mixing Processes. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: OEAS 730/830. This course will first provide a broad background in the concepts, theories and semi-analytical techniques used to describe turbulent motions and their effects in fluids. The various observational techniques that are presently used to measure turbulence in the ocean will be explored.
Also included is the issue of how community structure and function alter contribution to elemental cycling on a variety of temporal and spatial scales. Their biological reactivity and turnover times in aquatic systems and their dissolved and particulate organic material will be discussed in terms of mediate elemental cycling of these elements. Inorganic compounds and LECTURE 3 HOURS; 3 CREDITS. THIS CLASS WILL FOCUS ON BIOLOGICALLY MEDIATED DEPOSITIONAL SYSTEMS. WE WILL CONDUCT A SMALL RESEARCH PROJECT ALONG THE COAST OF VIRGINIA. FIELD TRIP REQUIRED.

LECTURE 2 HOURS; LABORATORY 2 HOURS; 3 CREDITS. ADVANCED TOPICS IN THE GEOCHEMISTRY OF MARINE SEDIMENTS, WITH AN EMPHASIS ON MATHEMATICAL MODELING OF SEDIMENTARY GEOCHEMICAL PROCESSES.

LECTURE, 3 HOURS. THE COURSE COVERS THE DISTRIBUTION, ABUNDANCE, AND BIOGEOCHEMICAL ACTIVITIES OF MICROORGANISMS IN THE OCEANS, WITH EMPHASIS ON PROKARYOTIC MICROBES AND VIRUSES. SYMBIOSES WITH HIGHER ORGANISMS, AND APPLIED ASPECTS OF MARINE MICROBIOLOGY, INCLUDING BIOFOULING AND CORROSION, INVASIVE SPECIES, AND MARINE BIOTECHNOLOGY ARE ALSO ADDRESSED.

LECTURE 3 HOURS; 3 CREDITS. THIS COURSE FOCUSES ON THE CAUSES (FORCINGS) OF CLIMATE CHANGE; NATURAL RESPONSE TIME OF THE CLIMATE SYSTEM; INTERACTIONS AND FEEDBACKS; AND THE GEOLOGIC RECORD IN CLIMATE CHANGE.

LECTURE 4 HOURS; 4 CREDITS. AN INTRODUCTION TO THE MAJOR QUESTIONS IN THE MANAGEMENT OF MARINE FISHERIES: ABUNDANCE, ESTIMATION, DISTRIBUTION, RECRUITMENT AND OPTIMUM YIELD. TOPICS ARE PRESENTED WITHIN THE CONTEXT OF FISHERIES MANAGEMENT, MARINE PRODUCTIVITY AND POPULATION ECOLGY, ALL OF WHICH SHAPE THE DIRECTION OF THE PRIMARY LITERATURE.

LECTURE 2 HOURS; LABORATORY 4 HOURS; 4 CREDITS. PREREQUISITE: OEAS 744/844. PRACTICE, PRINCIPLES AND THEORY OF APPLIED METHODS IN FISHERIES. SAMPLING AND DATA COLLECTION TOOLS, PRACTICE, AND THEORY. PRINCIPLES AND THEORY OF AGE DETERMINATION, ESTIMATION OF ABUNDANCE, REPRODUCTIVE BIOLOGY, MARKING AND TAGGING, AND MARK-RECAPTURE. SPECIAL TOPICS AS NECESSARY.

LECTURE 3 HOURS; 3 CREDITS. QUANTITATIVE METHODS FOR THE DESCRIPTION AND MANAGEMENT OF FISHERIES. ANALYTICAL AND EMPIRICAL FORECASTING MODELS USED TO STUDY CASE HISTORIES OF MANAGED FISH STOCKS. CASE STUDIES OF POORLY AND WELL MANAGED STOCKS.

LECTURE 3 HOURS; 3 CREDITS. TOPICS INCLUDE THE EVOLUTION OF REPRODUCTIVE STRATEGIES, MATURATION, BEHAVIOR, LARVAL ECOLOGY, AND RECRUITMENT.

LECTURE 3 HOURS; 3 CREDITS. THIS COURSE IS FOCUSED ON THE THEORY AND TECHNIQUES OF MATHEMATICAL MODEL DEVELOPMENT FOR MARINE ECOSYSTEMS. THE COURSE IS DESIGNED TO PROVIDE AN UNDERSTANDING OF HOW TO PARAMETERIZE INTERACTION AMONG COMPONENTS OF MARINE FOOD WEBS AND INTERACTION OF FOOD WEBS WITH PHYSICAL ENVIRONMENTS.

LECTURE 2 HOURS; LABORATORY 2 HOURS; 3 CREDITS. SEDIMENTARY PROCESSES IN DIFFERENT COASTAL ZONES WILL BE DESCRIBED: CARBONATE, EVAPORITIC, AND CLASTIC DEPOSITIONAL SYSTEMS. WE WILL CONDUCT A SMALL RESEARCH PROJECT ALONG THE COAST OF VIRGINIA. FIELD TRIP REQUIRED.

LECTURE 3 HOURS; 3 CREDITS. THIS CLASS WILL FOCUS ON BIOLOGICALLY MEDIATED ELEMENTAL CYCLING IN AQUATIC SYSTEMS. ASSIMILATORY AND DISSIMILATORY BIOLOGICAL PROCESSES INVOLVING AUTO- AND HETEROOTROPHIC ORGANISMS FREQUENTLY MEDIATE ELEMENTAL CYCLING OF THESE ELEMENTS. INORGANIC COMPOUNDS AND DISSOLVED AND PARTICULATE ORGANIC MATERIAL WILL BE DISCUSSED IN TERMS OF THEIR BIOLOGICAL REACTIVITY AND TURNOVER TIMES IN AQUATIC SYSTEMS AND THEIR CONTRIBUTION TO ELEMENTAL CYCLING ON A VARIETY OF TEMPORAL AND SPATIAL SCALES. ALSO INCLUDED IS THE ISSUE OF HOW COMMUNITY STRUCTURE AND FUNCTION ALTER BIOGEOCHEMICAL CYCLES.

LECTURE 3 HOURS; 3 CREDITS. THIS COURSE COVERS THE DISTRIBUTION, ABUNDANCE, AND BIOGEOCHEMICAL ACTIVITIES OF MICROORGANISMS IN THE OCEANS, WITH EMPHASIS ON PROKARYOTIC MICROBES AND VIRUSES. SYMBIOSES WITH HIGHER ORGANISMS, AND APPLIED ASPECTS OF MARINE MICROBIOLOGY, INCLUDING BIOFOULING AND CORROSION, INVASIVE SPECIES, AND MARINE BIOTECHNOLOGY ARE ALSO ADDRESSED.
OEAS 840. Plankton Dynamics. 3 Credits.
Lecture 3 hours; 3 credits. This course emphasizes the ecology of heterotrophic plankton from bacteria to protists, from metazoan invertebrate plankton to fish larvae. Students will explore the role of plankton groups and species in the context of pelagic ecosystems. Planktonic processes are not only relevant for the ocean ecosystem but also for fisheries, aquaculture, environmental and human health, and global climate. The course consists of lectures, discussion groups on selected reading material, and laboratory demonstrations.

OEAS 841. Fisheries Management. 4 Credits.
Lecture 4 hours; 4 credits. An introduction to the major questions in the management of marine fisheries: abundance, estimation, distribution, recruitment and optimum yield. Topics are presented within the context of fisheries management, marine productivity and population ecology, all of which shape the direction of the primary literature.

OEAS 843. Applied Methods of Fisheries. 4 Credits.
Lecture 2 hours; laboratory 4 hours; 4 credits. Prerequisite: OEAS 744/844. Practice, principles and theory of applied methods in fisheries. Sampling and data collection tools, practice, and theory. Principles and theory of age determination, estimation of abundance, reproductive biology, marking and tagging, and mark-recapture. Special topics as necessary.

OEAS 844. Fisheries Management. 3 Credits.
Lecture 3 hours; 3 credits. Quantitative methods for the description and management of fisheries. Analytical and empirical forecasting models used to study case histories of managed fish stocks. Case studies of poorly and well managed stocks.

OEAS 847. Reproduction and Larval Ecology of Marine Invertebrates. 3 Credits.
Lecture 3 hours; 3 credits. Topics include the evolution of reproductive strategies, maturation, behavior, larval ecology, and recruitment.

OEAS 855. Mathematical Modeling of Marine Ecosystems. 3 Credits.
Lecture 3 hours; 3 credits. This course is focused on the theory and techniques of mathematical model development for marine ecosystems. The course is designed to provide an understanding of how to parameterize interaction among components of marine food webs and interaction of food web components with physical environments.

OEAS 864. Coastal Sedimentology. 3 Credits.
Lecture 2 hours; laboratory 2 hours; 3 credits. Sedimentary processes in different coastal zones will be described: carbonate, evaporitic, and clastic depositional systems. We will conduct a small research project along the coast of Virginia. Field trip required.

OEAS 865. Marine Biogeochemistry. 3 Credits.
Lecture 3 hours; 3 credits. This class will focus on biologically mediated elemental cycling in aquatic systems. Assimilatory and dissimilatory biological processes involving auto- and heterotrophic organisms frequently mediate elemental cycling of these elements. Inorganic compounds and dissolved and particulate organic material will be discussed in terms of their biological reactivity and turnover times in aquatic systems and their contribution to elemental cycling on a variety of temporal and spatial scales. Also included is the issue of how community structure and function alter biogeochemical cycles.

OEAS 869. Internship in Oceanography. 1-3 Credits.
1-3 credits. Prerequisite: permission of the department.

OEAS 870. Aquatic Photosynthesis. 4 Credits.
Lecture 3 hours; laboratory 3 hours; 4 credits. This course examines the physics, chemistry, biology and ecology of photosynthesis by aquatic organisms. Topics include light harvesting, energy transfer, carbon metabolism and biosynthesis and their ecological consequences.

OEAS 872. Aquatic Optics. 4 Credits.
Lecture 3 hours; laboratory 3 hours; 4 credits. The course covers the physics of light transmission through the aquatic medium as affected by scattering and absorption, the optical properties of seawater, suspended particles of living cells, underwater vision and ocean color.

OEAS 895. Advanced Topics in Oceanography. 1-4 Credits.
1-3 credits each semester. An advanced investigation of a selected problem in physical, geological, chemical, or biological oceanography under the direction of the faculty of the Department of Ocean, Earth and Atmospheric Sciences.

OEAS 898. Doctoral Research. 1-9 Credits.
Any semester; hours to be arranged; variable credit, 1-9 credits per semester. Ph.D.-level research.

OEAS 899. Dissertation. 1-9 Credits.
Any semester; hours to be arranged; variable credit, 1-9 credits per semester. Ph.D.-level work primarily devoted to the writing of the dissertation.

OPMT - Operations Management

OPERATIONS MANAGEMENT Courses

OPMT 611. Operations Management with Quantitative Analysis. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: BNAL 600. Introduces concepts and frameworks for making decisions concerning designing, planning and controlling service and manufacturing operations. Concepts and issues related to process, layout, materials management, capacity, and quality, and how they affect productivity and customer satisfaction are discussed. Quantitative techniques such as linear programming, PERT/CPM, and control charts are used to make appropriate decisions.

OPMT 624. Cooperative Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: OPMT 611. Discusses the operations function in service organizations. Concepts and issues related to characteristics of services, managing demand, designing and delivering services, service processes and quality, human resource management in service systems will be discussed.

OPMT 667. COOPERATIVE EDUCATION. 1-3 Credits.
1-3 credits. Prerequisite: graduate standing. Approval for enrollment and allowable credits are determined by the department and Career Management in the semester prior to enrollment.

OPMT 668. Operations Management Internship. 1-3 Credits.
1-3 credits. Prerequisite: graduate standing. Approval for enrollment and allowable credits are determined by the department and Career Management in the semester prior to enrollment.

OPMT 695. Selected Topics in Operations Management. 3 Credits.
3 credits. Prerequisite: permission of the department chair and the graduate program director.

OPMT 697. Independent Study in Operations Management. 3 Credits.
3 credits. Prerequisite: OPMT 611. Affords students the opportunity to undertake independent study under the direction of a faculty member.

OPMT 795. Topics. 3 Credits.
Lecture 3 hours; 3 credits.

OPMT 895. Topics. 3 Credits.
Lecture 3 hours; 3 credits.

OTED - Occupational Technical Educ

OCCUPATIONAL TECHNICAL EDUC Courses

OTED 504. INSTRUCTION DESIGN/DEVELOPMENT. 3 Credits.
OTED 507. MAINSTREAM SPEC-STU VOC CLASS. 3 Credits.
OTED 595. TOPICS. 1-6 Credits.
OTED 793. INDEPENDENT STUDY. 3 Credits.
OTED 893. INDEPENDENT STUDY IN VOCA ED. 1-6 Credits.
PADM - Public Administration

PUBLIC ADMINISTRATION Courses

PADM 632. Environmental Planning. 3 Credits.
Lecture 3 hours; 3 credits. Environmental analysis and the planning process; administrative agency structure, policy development, regulation and enforcement, content and use of the environmental impact statement.

PADM 633. Methods of Urban Planning. 3 Credits.
Lecture 3 hours; 3 credits. A survey of the methods of local planning in the governmental and administrative setting. The course is geared toward the administrator and technician in dealing with urban planning problems.

PADM 634. Regional Planning. 3 Credits.
Lecture 3 hours; 3 credits. The course analyzes the origins of regional planning agencies, current organizational structures, financing and functional activities. The focus is on the application of the systems approach to metropolitan planning issues. This latter objective is achieved through participation in exercises dealing with economics, transportation and land-use allocation modeling.

PADM 640. Urban and Regional Issues. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: permission from an advisor. Basic definitions and concepts in urban studies, interdisciplinary perspectives on the urban process from the perspectives of history, economics, geography, sociology, political science and related disciplines. Some focus on the qualities of urban research activities.

PADM 651. Administrative Theory I: The Context of Public Administration. 3 Credits.
Lecture 3 hours; 3 credits. Introduction to the profession of public administration; the evolution and development of the field, the role of organizations in contemporary American government, and the roles of politics and administration. The course also provides an introduction to the necessary skills for successful graduate study.

PADM 652. Administrative Theory II: The Process of Public Administration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PADM 651. Introduction to management in the public sector. Topics include: organizing public agencies, managing people and work groups, introduction to organizational systems (human resources, budget, and information systems), and effective leadership and decision-making processes.

PADM 655. Theories of Public Organization. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Analysis of public organizations from environmental (macro) and organizational (micro) viewpoints, viewed as both closed and open systems. The course also examines organizational behavior, design, structure and evaluation.

PADM 668. Internship/Field Experience. 3-6 Credits.
3 or 6 credits. Required of all students without previous experience in government service. Supervised work experience in a public agency. A written report will be required.

PADM 671. Public Budgeting and Financial Management. 3 Credits.
Lecture 3 hours; 3 credits. The purpose of this course is to examine the institutions, principles, and techniques of national, state, and local budgeting processes and financial administration. The course explores the allocation as well as the re-distributive role of government and the market. While applying information technology, students will analyze the practices and fundamental concepts of government budgeting, financial management, and public finance, with an emphasis on revenue, expenditure, capital budgeting and debt structures.

PADM 672. Public Financial Management. 3 Credits.
Lecture, 3 hours; 3 credits. Examination of public sector financial management principles, practices and processes. Emphasis on financial auxiliary services employed in local government financial management. Introduction to governmental accounting practices and financial statements. Micro computer applications to public sector financial decision-making techniques.

PADM 690. Urban and Regional Issues. 3 Credits.
3 cr. Lecture. Prerequisite: permission from an advisor. Basic definitions and concepts in urban studies, interdisciplinary perspectives on the urban process from the perspectives of history, economics, geography, sociology, political science and related disciplines. Some focus on the qualities of urban research activities.

PADM 695. Advanced Topics. 1-3 Credits.
Lecture and discussion; 1-3 credits. Topics vary each semester.

PADM 696. Directed Readings. 1-3 Credits.
1-3 credits. Specifically planned readings for the graduate student who wishes to pursue special interests outside the scope of formal studies. Supervised on an individual basis.

PADM 698. Directed Research. 1-6 Credits.
1-6 credits. Supervised research on a specific program. A written report will be required.

PADM 699. Thesis. 3-6 Credits.
6 credits. An approved research project, written under the supervision of a faculty committee, in which the student demonstrates the capacity to design and complete independent scholarly investigation. The completed project must be approved by the thesis committee.

PADM 701. Urban Resource Allocation. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Exploration of key theories and approaches to public policy. This course covers all phases of the policy process, from formulation to evaluation, with particular focus upon the substance, political dynamics, and evolution of public policy.

PADM 702. Urban Resource Allocation. 3 Credits.
Lecture 3 hours; 3 credits. This course has three basic emphases: (a) theories of resource allocation; (b) analytical techniques useful in resource allocation analysis; and (c) methods of control for resource allocation. Includes techniques of cost effectiveness, budgeting, expenditure analysis as they relate to the urban environment.

PADM 704. Methods of Program Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PADM 753/853. Examination of various methodologies for designing and conducting program evaluation and research. Experimental, quasi-experimental and nonexperimental procedures will be covered.

PADM 705. Urban Law and Public Policy. 3 Credits.
Lecture 3 hours; 3 credits. Focuses on legal aspects of urban policy by analyzing primary legal materials, including court decisions and legislative and administrative regulations. Skills of legal interpretation and legal draftsmanship are developed.

PADM 708. Urban and Regional Economic Development. 3 Credits.
Lecture 3 hours; 3 credits. This course examines the theory and practice of urban and regional economic development. The tools, institutions, and analytical techniques of urban and regional economic development are examined in light of relevant public policy issues.

PADM 711. Urban Services Administration. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Analysis of the range of administrative tools and strategies for the delivery of urban services. Emphasizes new administrative alternatives under conditions of urban change.

PADM 712. Emergency Management and Policy. 3 Credits.
Lecture 3 hours; 3 credits. Explores policy and regulatory issues of emergency management; intergovernmental responsibilities and relationships among local, state and federal agencies in an “all hazards” approach to preparing and responding to manmade and natural disasters. Examines challenges faced by local, state, and federal managers during a large scale disaster.
PADM 714. Public-Private Partnerships. 3 Credits.
Lecture 3 hours; 3 credits. An in-depth analysis of the forces behind the privatization movement. Examines the context of privatization, the theoretical and empirical arguments on both sides of the debate, and the different forms of privatization practiced in the U.S. The course draws on a wide range of disciplines in a quest for an understanding of the privatization phenomenon—political science, public administration, public policy, sociology, economics, management, and others.

PADM 715. Management of Nonprofit Organizations. 3 Credits.
Lecture 3 hours; 3 credits. Successful nonprofit organizations require substantial capability in key areas of management such as developing a strong board of directors, recruiting and motivating talented staff and volunteers, creating a strategic plan and wisely managing fiscal and human resources. This course addresses these topics from theoretical and practitioner perspectives.

PADM 716. Introduction to Nonprofit Sector. 3 Credits.
Lecture 3 hours; 3 credits. This course offers a broad introduction to the study and practice of the nonprofit sector. The course explores the history, scope, and significance of the nonprofit sector as it relates to philanthropy, voluntary action, civil society, and civic engagement.

PADM 717. Nonprofit Financial Management and Fund Raising. 3 Credits.
Lecture 3 hours; 3 credits. This course provides students with the knowledge to become effective financial managers by giving them practical applications of theory and skill-building in fiscal processes and fundraising of nonprofit organizations.

PADM 719. Leadership. 3 Credits.
Lecture 3 hours; 3 credits. Examines leadership through theoretical and practice-based frameworks. Offers analytical and intellectual examination and reflection on core issues in the practice of leadership. These objectives will be achieved through open discussion, honest self-assessment, experiential exercises, and observation of real-life leadership practice.

PADM 720. Public Personnel Administration. 3 Credits.
Lecture 3 hours; 3 credits. Examines the basic framework of the public personnel system beginning with the legal requirements imposed by federal and state laws and regulations. General considerations of policy and procedures development, the organization of the public personnel system, the adoption of the personnel ordinance, the determination of various levels of employee status and the coverage of the personnel system are included.

PADM 721. Transportation Policy. 3 Credits.
Lecture, 3 hours; 3 credits. This course focuses on surface transportation policy and planning, and highways and roads in particular. Topics include local, state and federal policies, public involvement in transportation planning, transportation and highway finance, privatization and public-private partnerships, critical issues and policy questions.

PADM 723. Ethics in Public Administration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PADM 651. This course reviews the theory and application of ethics in the public sector, identifying public values and how they apply in the administration of government. It reviews sources of values employed in public sector decision-making, and reviews how values in public administration are managed and applied. Systems of professional ethics are reviewed in the context of public professions. Case studies and best practices are examined to help the student understand the application of administrative ethics in public management.

PADM 724. Administration of Human Services. 3 Credits.
Lecture 3 hours; 3 credits. Analysis of human services involving direct client/agency interaction. Problems of discretion and control are examined as alternative service delivery strategies which can deal with these problems.

PADM 725. Business, Government, and Society. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: six completed hours of graduate work in MBA or MPA program. An overview of business-government-society interactions, with special attention to the influence of public policy and corporate strategy on corporate social responsibility. An important theme is the ethical component of management decision making.

PADM 727. Public Procurement and Project Management. 3 Credits.
Lecture 3 hours; 3 credits. Course covers each phase of the public procurement project cycle, with an emphasis on tools and techniques to manage a public procurement project.

PADM 730. Theoretical Conflict Resolution and Problem Solving. 3 Credits.
Lecture 3 hours; 3 credits. An introduction to the field of alternative dispute resolution methods and problem solving. The first part of the course focuses on conflict theory at all levels of human social systems and the second part examines collaborative problem solving strategies.

PADM 733. Legal and Ethical Foundations of Public Administration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PADM 730. The course provides conceptual and practical skills in negotiation. It examines the underlying cultural, legal, and organizational issues and problems that affect managing human resources in the workplace.

PADM 734. Negotiation and Dispute Resolution. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PADM 730. The course provides conceptual and practical skills in negotiation. It examines the underlying cultural, legal, and organizational issues and problems that affect managing human resources in the workplace.

PADM 753. Research Methods in Public Administration. 3 Credits.
Lecture/cases/activities; 3 credits. Examination of the theory and practice of organization development. Participants will take the role of change agent and public manager and apply a range of organization development techniques to public agency situations while giving attention to the particular cultural, political, legal and organizational characteristics of public organizations.

PADM 746. Capstone Seminar in Public Administration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: completion of 30 hours in the MPA program or permission of instructor. Presents an integrated approach to the field of public administration, and examines the political, administrative, and social implications of organizational careers. The emphasis of the course will be a case approach to public administration and public management.

PADM 757. Research Methods in Public Administration. 3 Credits.
Lecture 3 hours; 3 credits. This course examines various methods for designing and conducting research, collecting and organizing data, and disseminating results. Information technology and applications to practical management problems and public research topics are emphasized.

PADM 781. Intergovernmental Management. 3 Credits.
Lecture 3 hours; 3 credits. Analysis of relationships among federal, state, and local governmental units in the delivery of governmental programs. Focus on intergovernmental issues in urban metropolitan regions.
PAUP 795. Advanced Topics in Public Personnel Administration. 3 Credits.
Lecture 3 hours; 3 credits. An examination of selected topics including job analysis, position classification, test construction, performance appraisal, and affirmative action. The course emphasizes the everyday application of these topics through in-class exercises and short papers. Permission of advisor is required.

PAUP 817. Nonprofit Financial Management and Fund Raising. 3 Credits.
Lecture 3 hours; 3 credits. This course provides students with the knowledge to become effective financial managers by giving them practical applications of theory and skill-building in fiscal processes and fundraising of nonprofit organizations.

PAUP 821. Transportation Policy. 3 Credits.
Lecture, 3 hours; 3 credits. This course focuses on surface transportation policy and planning, and highways and roads in particular. Topics include local, state and federal policies, public involvement in transportation planning, transportation and highway finance, privatization and public-private partnerships, critical issues and policy questions.

PAUP 830. Theories of Conflict Resolution and Problem Solving. 3 Credits.

PAUP 845. Managing Development and Change in Organizations. 3 Credits.

PAUP 999. Public Administration 999. 1 Credit.

PAUP - Public Admin/Urban Policy

PUBLIC ADMIN/URBAN POLICY Courses

PAUP 801. Theories of Public Policy. 3 Credits.
Lecture 3 hours; 3 credits. Exploration of key theories and approaches to public policy. This course covers all phases of the policy process, from formulation to evaluation, with particular focus upon the substance, political dynamics, and evolution of public policy.

PAUP 802. Logic of Social Inquiry. 3 Credits.
Lecture 3 hours; 3 credits. Social inquiry, the production and application of social science knowledge in the field of public administration/public management and urban policy, is replete with contending philosophical and paradigmatic points of view. The goal of this course is to provide a forum for students to review and critique the major issues within social inquiry: ways of knowing (questions of epistemology and methodology), ways of deciding and ways of acting upon decisions.

PAUP 803. Multivariate Quantitative Analysis for Public Administration. 3 Credits.
This course explores the proper use, calculation, and interpretation of multivariate statistics as commonly found in the literature in public administration. The course will prepare students to choose the appropriate statistical tools, generate testable hypotheses, correctly apply the statistical tool, analyze the results, and present and interpret the results of those tests in a manner appropriate for public in the field.

PAUP 804. Policy and Program Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PADM 753 or URBN 607. Examination of various methodologies for designing and conducting public urban program evaluation and research. Experimental, quasi-experimental and nonexperimental procedures will be covered.

PAUP 805. Urban Law and Public Policy. 3 Credits.
Lecture 3 hours; 3 credits. Focuses on legal aspects of urban policy by analyzing primary legal materials, including court decisions and legislative and administrative regulations. Skills of legal interpretation and legal draftsmanship are developed.

PAUP 806. Urban Resource Allocation. 3 Credits.

PAUP 807. Urban Theory and Practice. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of instructor or graduate program director. The purpose of this course is to convey an understanding of urban theory and practice in the culturally diverse urban environment. The course focuses on the process of urbanization, social differentiation, and social and political organization. Special emphasis is given to the role of technology in contributing to urban change.

PAUP 808. Intellectual Foundations of Public Administration. 3 Credits.
Lecture 3 hours; 3 credits. The course reviews the broad topics of administration theory, behavior and practice in organizations and focuses on the development of management thoughts, as well as the macro and micro organizational processes in public and non-profit organizations.

PAUP 809. Public Organization Behavior and Theory. 3 Credits.
Lecture 3 hours; 3 credits. This course is intended to provide a forum for students to discuss and advance their knowledge of the broad classical and modern organizations theories and behavior. The goal is that in the process of discussing the theories of organization, students will develop expertise in specific, cutting edge areas of academic thoughts of the field.

PAUP 810. Governance and Accountability. 3 Credits.
Lecture 3 hours; 3 credits. Public law defines the structure and authorized practices of public institutions in urban settings. The course reviews the legal powers of state and local government in the U.S., of cities, counties, public authorities and special districts, and of nontraditional forms of governance including principal-agent relations in the production of public services, regulatory governance, delegation of public authority to private entities, and citizen roles in governance.

PAUP 811. Urban Services Administration. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Analysis of the range of administrative tools and strategies for the delivery of urban services. Emphasizes new administrative alternatives under conditions of urban change.

PAUP 812. Public Policy Formulation and Implementation. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on public policy formulation and implementation. The purpose of this course is to examine the bases upon which public policy discussions take place, both at the formulation and implementation stages of the policy process. The goal is to develop a solid understanding of theory and empirical research bearing on critical dimensions of policy and the policy process.

PAUP 813. Contemporary Public Administration Theory. 3 Credits.
Lecture 3 hours, 3 credits. The purpose of this course is to enhance the knowledge inventory of doctoral students and better prepare them for academic careers in the field of public administration in the long term. Students will be exposed to a discussion of the current literature on legitimacy issues, phenomenological issues, gender issues, and Postmodernism in public administration.

PAUP 814. Public-Private Partnerships. 3 Credits.
Lecture 3 hours; 3 credits. An in-depth analysis of the forces behind the privatization movement. Examines the context of privatization, the theoretical and empirical arguments on both sides of the debate, and the different forms of privatization practiced in the U.S. The course draws on a wide range of disciplines in a quest for an understanding of the privatization phenomenon—a political science, public administration, public policy, sociology, economics, management, and others.

PAUP 820. Public Personnel Administration. 3 Credits.
Lecture 3 hours; 3 credits. Examines the basic framework of the public personnel system beginning with the legal requirements imposed by federal and state laws and regulations. General considerations of policy and procedures development, the organization of the public personnel system, the adoption of the personnel ordinance, the determination of various levels of employee status and the coverage of the personnel system are included.
PAUP 823. Ethics in Public Administration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PADM 651. This course reviews the theory and application of ethics in the public sector, identifying public values and how they apply in the administration of government. It reviews sources of values employed in public sector decision-making, and reviews how values in public administration are managed and applied. Systems of professional ethics are reviewed in the context of public professions. Case studies and best practices are examined to help the student understand the application of administrative ethics in public management.

PAUP 824. Administration of Human Services. 3 Credits.
Lecture 3 hours; 3 credits. Analysis of human services involving direct client/agency interaction. Problems of discretion and control are examined as alternative service delivery strategies which can deal with these problems.

PAUP 825. Business, Government, and Society. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: six completed hours of graduate work in MBA or MPA program. An overview of business-government-society interactions, with special attention to the influence of public policy and corporate strategy on corporate social responsibility. An important theme is the ethical component of management decision making.

PAUP 830. Theories of Conflict Resolution and Problem Solving. 3 Credits.
Lecture 3 hours; 3 credits. An introduction to the field of alternative dispute resolution methods and problem solving. The first part of the course focuses on conflict theory at all levels of human social systems and the second part examines collaborative problem solving strategies.

PAUP 833. Legal Foundations of Public Administration. 3 Credits.
Lecture 3 hours; 3 credits. Focus on the processes of law and law application by the executive departments of government and especially the independent regulatory agencies, and their control by legislature and court. Examination of the political origins and constitutional status of administrative agencies and of administration discretion.

PAUP 834. Negotiation and Dispute Resolution. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PADM 730. The course provides conceptual and practical skills in negotiations. It examines the underlying cultural, legal, and organizational issues and problems that affect managing human resources in the workplace.

PAUP 837. Digital Government. 3 Credits.
Lecture 3 hours; 3 credits. This course provides public administrators knowledge of current technology issues in the public sector and familiarizes them with technological tools used in delivering public services. The course explores administrative responsibility and accountability in digital government, and problems in managing technology in the public sector. Issues concerning citizen privacy, freedom of information requirements, planning, coordinating and sharing information among public sector agencies and the private sector, and building community networks are reviewed.

PAUP 838. Conflict Mediation and Arbitration. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PADM 730. Surveys the field of third-party intervention in dispute resolution. Provides practical skills in mediation and arbitration. Examines the nature and effectiveness of mediation in a wide variety of disputes including labor relations, community, family, environmental, and international conflicts.

PAUP 845. Managing Development and Change in Public Organizations. 3 Credits.
Lecture/cases/activities; 3 credits. Examination of the theory and practice of organization development. Participants will take the role of change agent and public manager and apply a range of organization development techniques to public agency situations while giving attention to the particular cultural, political, legal and organizational characteristics of public organizations.

PAUP 853. Research and Evaluation Design. 3 Credits.
Lecture 3 hours; 3 credits. The course examines advanced research design and evaluation methods used in public administration and management research. Experimental, quasi-experimental, and non-experimental procedures in the context of urban settings will be emphasized. Includes usage of various statistical software.

PAUP 854. Advanced Public Program Evaluation. 3 Credits.
PAUP 857. Advanced Public Research and Decision Making Methods. 3 Credits.

PAUP 868. Urban Services Internship. 3 Credits.
3 credit hours. Urban field experience for students in the Ph.D. in Public Administration and Urban Policy program. Supervised work experience in a public agency. A written report is required.

PAUP 881. Intergovernmental Relations. 3 Credits.
Lecture 3 hours; 3 credits. Analysis of relationship among federal, state, and local governmental units in the delivery of governmental programs. Focus on intergovernmental issues in urban metropolitan regions.

PAUP 890. Dissertation Seminar. 3 Credits.
3 credit hours. A multidisciplinary seminar that focuses on the design, implementation, and evaluation of urban programs under real-life conditions in the field. Students and faculty work with urban decision makers utilizing problem-solving skills and analysis.

PAUP 895. Advanced Topics in Public Personnel Administration. 3 Credits.

PAUP 898. Directed Research. 1-6 Credits.
1-6 credits. Supervised research on a specific problem. A written report is required.

PAUP 899. Dissertation. 1-12 Credits.
1 to 12 credits. An approved research project, written under the supervision of a faculty advisor, in which the student demonstrates the capacity of design and compiles independent applied research. The completed project must be approved by the dissertation committee.

PE - Physical Education

PHYSICAL EDUCATION Courses

PE 504. Adapted Physical Education. 3 Credits.
Lecture 3 hours; laboratory 2 hours; 4 credits. Students will be acquainted with and research the different disabilities, learning modes of the exceptional child, IDEA-the law that advocates free and appropriate education, and working with the child with disabilities within an ecosystem. A vital component of the course will be the practical application of theory.

PE 597. Topics in Health and Physical Education. 1-3 Credits.
This course provides an opportunity for in-depth study of selected topics in health and physical education. Prerequisites: approval of program advisor.

PHIL - Philosophy

PHILOSOPHY Courses

PHIIL 502. Gender and Philosophy. 3 Credits.
A philosophical survey of approaches to understanding gender and gender differences. The course will also serve as an introduction to feminist philosophy, with a particular emphasis on feminist ethics.

PHIIL 504. Twentieth-Century Continental Philosophy. 3 Credits.
A study of influential contemporary movements in European philosophy. Emphasis will be given to the writings of Husserl, Heidegger, Sartre, Gadamer, Derrida, and Foucault.

PHIIL 506. Contemporary Analytic Philosophy. 3 Credits.
A study of the twentieth-century analytic tradition, including such thinkers as Moore, Russell, Wittgenstein, Ayer, Carnap, Ryle, Wisdom, and Austin.

PHIIL 510. Social and Political Philosophy. 3 Credits.
A philosophical analysis of the relation between man, society, and the state, studying about a dozen philosophers since Plato on such topics as justice, authority, law, freedom, and civil rights.
PHIL 511. Postmodernism and Political Philosophy. 3 Credits. 
An examination of intellectual currents in postmodernism as they pertain to central questions in social and political thought. The course covers the roots of modernism in the Enlightenment and various challenges to modernism in 19th and 20th century thought. Particular attention is given to the prospects for democracy in postmodern thinking.

PHIL 512. Philosophy of Law. 3 Credits. 
An examination of the nature of law and philosophical issues concerning the law.

PHIL 517. Philosophy and Educational Issues. 3 Credits. 
Considers the relationship of philosophy and education. Topics considered include: philosophy as a foundation for education, education as an institution, and educational and philosophical issues as they relate to each other.

PHIL 523. Philosophy of Work. 3 Credits. 
An examination of philosophical issues surrounding the practice of work. Topics to be discussed may include the definition of work, alienation, exploitation, whether there is a right to work or a right not to work, religious perspectives on work, and gender issues in work.

PHIL 527. Myth and Philosophy. 3 Credits. 
A study of the nature of myth, its role and importance in human thought. The analysis will stress the relationships between mythology, religion, literature, drama, and philosophy in ancient Greece.

PHIL 531. Nineteenth-Century Philosophy. 3 Credits. 
A study of significant intellectual innovations and revolutions in nineteenth century European thought that helped shape the modern mind. Emphasis will be given to the writings of Kant, Schopenhauer, Hegel, Marx, Kierkegaard and Nietzsche.

PHIL 534. Contemporary Theory of Knowledge. 3 Credits. 
This course provides students with a problem-oriented, critical, and comparative understanding of problems in contemporary epistemology. Topics include skepticism and responses thereto, analyses of knowledge, the externalist versus internalist debate, foundationalism and coherentism, and social approaches to knowledge including contextualism and feminism.

PHIL 535. Philosophy of Psychology. 3 Credits. 
An examination of various ways in which the mind has been understood in philosophy and in psychology and of the methods that have been used in the study of the mind.

PHIL 540. Philosophy of Natural Sciences. 3 Credits. 
A study of the concepts and philosophical problems common to the natural sciences: scientific reasoning, confirmation, explanation, laws, meaning, theories, revolutions, progress, and values.

PHIL 541. Foundations of Ethics. 3 Credits. 
An inquiry into the philosophical foundations of ethical theory. Various ethical systems are considered, and different views of metaethics and moral psychology may be as well.

PHIL 542. Studies in Applied Ethics. 3 Credits. 
An intensive examination of ethical issues in a particular field or profession; an emphasis on ethical theory underlying practical decisions.

PHIL 580. Hinduism. 3 Credits. 
An intensive study of the basic teachings of Hinduism as manifested in its sacred writings.

PHIL 581. Buddhism. 3 Credits. 
A study of the origin, historical development, and contemporary status of Buddhism, in terms of its religious and philosophical elements and its influence in Asian cultures.

PHIL 582. Chinese Religion and Philosophy. 3 Credits. 
A study of Chinese thought emphasizing Early and Classical Confucianism and Taoism, Chinese Buddhism, and Neo-Confucianism. Modern currents of Chinese thought are also discussed.

PHIL 585. Japanese Religion and Philosophy. 3 Credits. 
A study of the religious and philosophical traditions of Japan. Emphasis will be given to Shintoism, Buddhism, and Neo-Confucianism and their contemporary status and influence in Japanese culture.

PHIL 591. Seminar in Philosophy. 3 Credits. 
Intensive examination of the thought of one major philosopher.

PHIL 592. Seminar in Philosophy. 3 Credits. 
Intensive examination of the thought of one major philosopher.

PHIL 593. Seminar in Philosophy. 3 Credits. 
Intensive examination of the thought of one major philosopher.

PHIL 594. Seminar in Philosophy. 3 Credits. 
Intensive examination of the thought of one major philosopher.

PHIL 595. Topics in Philosophy, 1-3 Credits. 
The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule, and will be more fully described in information distributed to all academic advisors.

PHIL 596. Topics in Philosophy, 1-3 Credits. 
The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule, and will be more fully described in information distributed to all academic advisors.

PHIL 597. Tutorial Work in Special Topics in Philosophy. 1-3 Credits. 
Independent reading and study of a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

PHIL 598. Tutorial Work in Special Topics in Philosophy. 1-3 Credits. 
Independent reading and study of a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

PHIL 603. Studies in Social and Political Philosophy. 3 Credits. 
An intensive study of one or more figures, movements, or theoretical questions in social and political philosophy. Prerequisites: One 500-level Philosophy course with a grade of “B” or higher (or equivalent).

PHIL 606. Studies in Asian Philosophy. 3 Credits. 
An intensive study of one concept, movement, or thinker indigenous to the Asian philosophical tradition.

PHIL 608. Studies in Ancient Philosophy. 3 Credits. 
A study of certain philosophers, movements or specific philosophical issues in the ancient Greek and early Roman periods. Prerequisites: One 500-level Philosophy course with a grade of “B” or higher (or equivalent).

PHIL 609. Studies in the Philosophy of Science. 3 Credits. 
A consideration of some philosophical problem or problem area related to science or to some position or tradition in the philosophy of science. Prerequisites: One 500-level Philosophy course with a grade of “B” or higher (or equivalent).

PHIL 610. Studies in the Philosophy of Art. 3 Credits. 
An evaluation of the field of art in relation to the rest of human culture, emphasizing the various approaches that may be used. Prerequisites: One 500-level Philosophy course with a grade of “B” or higher (or equivalent).

PHIL 611. Studies in the History of Philosophy. 3 Credits. 
A consideration of selected themes in the history of philosophy, or the specific examination of one major philosopher or group of related philosophers. Prerequisites: One 500-level Philosophy course with a grade of “B” or higher (or equivalent).

PHIL 695. Topics in Philosophy, 3 Credits. 
Prerequisites: One 500-level Philosophy course with a grade of “B” or higher (or equivalent). The advanced study of selected topics designed to permit small groups of qualifies students to work in subjects of mutual interest that, due to their specialized nature, may not be offered regularly.
PHIL 697. Tutorial Work in Special Topics in Philosophy. 1-3 Credits. 
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: approval of the department chair and one 500-level Philosophy course with a grade of “B” or higher (or equivalent).

PHIL 698. Tutorial Work in Special Topics in Philosophy. 1-3 Credits. 
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: approval of the department chair and one 500-level Philosophy course with a grade of “B” or higher (or equivalent).

PHIL 707. Ethics in Public Health Practice. 1-3 Credits. 
An investigation of ethical issues in public health policy, practice, and research. Students will develop a capacity for reasoned judgments in these matters by understanding and applying basic moral concepts, theories, and ideals. Prerequisites: open to all graduate students in relevant fields.

PHIL 710. International Rights. 3 Credits. 
A philosophical study of rights applicable to the international arena. Theories from the early Modern European period to the present day will be treated. Coverage includes international law, the rights of nations, and human rights. Prerequisites: approval of instructor.

PHIL 795. Topics in Philosophy. 3 Credits. 
The advanced study of special topics that may not be offered regularly.

PHIL 797. Tutorial in Philosophy. 1-3 Credits. 
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: approval of the department chair.

PHIL 807. Ethics in Public Health Practice. 1-3 Credits. 
An investigation of ethical issues in public health policy, practice, and research. Students will develop a capacity for reasoned judgments in these matters by understanding and applying basic moral concepts, theories, and ideals. Prerequisites: Open to all graduate students in relevant fields.

PHIL 810. International Rights. 3 Credits. 
A philosophical study of rights applicable to the international arena. Theories from the early Modern European period to the present day will be treated. Coverage includes international law, the rights of nations, and human rights. Prerequisites: approval of instructor.

PHIL 895. Topics in Philosophy. 3 Credits. 
The advanced study of special topics that may not be offered regularly.

PHIL 897. Tutorial in Philosophy. 1-3 Credits. 
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: approval of the department chair.

PHYS 503. Electronic Instrumentation. 3 Credits.
PHYS 506. Observational Astronomy. 3 Credits. 
Lecture 3 hours; 3 credits. Observational techniques in astronomy with emphasis on constellation identification, celestial movements, and telescopic observation. Individualized night observations are required.

PHYS 508. Astronomy for Teachers. 3 Credits. 
Lecture 3 hours; 3 credits. A course in astronomy dealing with stars and stellar systems. Topics will include observational astronomy, the electromagnetic spectrum, relativity, stellar and galactic structures, cosmology, and the search for extraterrestrial intelligence.

PHYS 513. Methods of Experimental Physics. 3 Credits. 
Laboratory 6 hours; 3 credits. Experiments in classical and modern physics, designed to develop skills in the collection, analysis, and interpretation of experimental data.

PHYS 515. Introduction to Nuclear Particle Physics. 3 Credits. 
Lecture 3 hours; 3 credits. An introduction to the structure of the atomic nucleus, natural and artificial radioactivity, nuclear decay processes and stability of nuclei, nuclear reactions, properties of nuclear forces, and nuclear models. Also, particle phenomenology, experimental techniques and the standard model. Topics include the spectra of leptons, mesons, and baryons; strong, weak, and electromagnetic interactions.

PHYS 516. Introduction to Solid State Physics. 3 Credits. 
Introduction to solid state physics and materials science, with emphasis placed on the applications of each topic to experimental and analytical techniques. Topics include crystallography, thermal and vibrational properties of crystals and semiconductors, metals and the band theory of solids, superconductivity and the magnetic properties of materials.

PHYS 517. Introduction to Particle Accelerator Physics. 3 Credits. 
Lecture 3 hours; 3 credits. Introduction to the historical development and applications of particle accelerators to the fields of nuclear physics, particle physics, material sciences, and medical therapy and the design and physics of particle accelerators. Aspects of linear accelerators, circular accelerators such as cyclotrons, betatrons, synchrotrons, and storage rings, and recirculated linacs are covered. Topics include linear and non-linear single particle motion in accelerators, collective effects and beam stability in particle accelerators, and the electromagnetic radiation emitted by relativistic particles in accelerators. Up to date descriptions of the most modern particle accelerators will be included, as well as applications such as fixed target nuclear physics arrangements, colliding beam accelerators for high energy physics research, advanced storage ring sources of X-Rays, advanced neutron sources, radiation and radioactive material sources, and cancer therapy devices.

PHYS 520. Introductory Computational Physics. 3 Credits. 
Lecture 2 hours; Laboratory 2 hours; 3 credits. Introduction of computational methods and visualization techniques for problem solving in physics.

PHYS 525. Electromagnetism I. 3 Credits. 
Lecture, 3 hours. 3 credits. A study of the classical theory and phenomena of electricity and magnetism. Topics include the calculation of electric and magnetic fields, magnetic and dielectric properties of matter, and an introduction to Maxwell’s equations.

PHYS 551. Theoretical Mechanics. 3 Credits. 
A mathematical study of the concepts of mechanics. Vector calculus methods are used. Topics include mechanics of a system of particles, Lagrangian mechanics, Hamilton’s canonical equations, and motion of a rigid body.

PHYS 552. Introduction to Quantum Mechanics. 3 Credits. 
Lecture 3 hours; 3 credits. Prerequisites: PHYS 319 and 323. Introduction to the physical and mathematical structure of quantum theory, including the historical and experimental origins of the subject. The curriculum includes techniques for solving the Schrodinger wave equation, particularly for the harmonic oscillator and the hydrogen atom.

PHYS 553. Electromagnetism II. 3 Credits. 
A course in electrodynamics developed from Maxwell’s Equations. Topics include Maxwell’s Equations, Conservation Laws, Electromagnetic Waves, Potentials and Fields, Radiation, and the interplay of electrodynamics and special relativity.

PHYS 554. Thermal and Statistical Physics. 3 Credits. 
Lecture 3 hours; 3 credits. A study of the fundamental concepts of thermodynamics, kinetic theory, and statistical mechanics. Topics include the thermodynamics of simple systems, kinetic theory of gases, statistical mechanics of gases and an introduction to quantum statistics.

PHYS 556. Intermediate Quantum Mechanics. 3 Credits. 
This course follows directly from PHYS 552. It includes a more detailed study of simple systems, an introduction to abstract quantum mechanics and Dirac notation, and applications to operator methods. Particular attention is paid to electron spin, angular momentum theory, operator treatment of the harmonic oscillator, the Pauli exclusion principle, perturbation theory, and scattering.
PHYS 597. Special Problems and Research. 1-3 Credits.
1-3 credits each semester. Prerequisite: permission of the instructor. These courses afford the student an opportunity to pursue individual study and research.

PHYS 601. Mathematical Methods in Physics. 3 Credits.
Lecture 3 hours; 3 credits. Basic mathematical methods and their applications: infinite series, functions of complex variables, complex analysis, Fourier series, Fourier and Laplace transformations.

PHYS 603. Classical Mechanics. 3 Credits.

PHYS 604. Classical Electrodynamics I. 3 Credits.

PHYS 621. Quantum Mechanics I. 3 Credits.

PHYS 695. Selected Topics in Pure and Applied Physics. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

PHYS 696. Special Topics in Accelerator Physics. 3 Credits.
Special topics related to particle accelerators and their applications. Departmental approval required.

PHYS 697. Seminar. 1 Credit.

PHYS 698. Research. 3 Credits.

PHYS 699. Research. 3 Credits.

PHYS 701. Mathematical Methods of Physics II. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: PHYS 601. Group theory, Lie groups and Lie algebras, differential geometry, tensor fields on manifolds, integral calculus of differential forms.

PHYS 704. Classical Electrodynamics II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PHYS 604. Electrodynamics: Maxwell equations, plane electromagnetic waves and wave propagation, waveguides, radiating systems, special theory of relativity, including the dynamics of relativistic particles and electromagnetic fields.

PHYS 707. Statistical Mechanics. 3 Credits.
Lecture 3 hours; 3 hours; 3 credits. Prerequisite: PHYS 603. Review of thermodynamics. Classical statistical mechanics and applications. The virial expansion. Quantum statistical mechanics and the micro-canonical, canonical, and grand-canonical ensembles. The Fermi and Bose gases, and applications. Superfluids.

PHYS 711. Computational Physics. 3 Credits.
Lecture 3 hours; 3 credits. Studies of high level computer languages. Computational techniques used in physics. Numerical techniques for differential and integral problems. Algebraic processing languages. Introduction to scientific visualization techniques.

PHYS 721. Quantum Mechanics II. 3 Credits.

PHYS 722. Nuclear and Particle Physics I. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PHYS 621. Nuclear forces, models of nuclear structure and reactions, hadron and lepton scattering, introduction to constituent quark model and hadron spectroscopy.

PHYS 723. Nuclear and Particle Physics II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PHYS 722 or PHYS 822. Discrete and continuous symmetries and application to particle physics, SU(2) and SU(3) symmetries and static properties of hadron. Klein-Gordon and Dirac equations, quantum electrodynamics and Feynman rules, strong and weak interactions, Standard Model and physics beyond the Standard Model.

PHYS 724. Solid State I. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PHYS 621. The first part of the condensed matter course includes electronic and lattice properties of solids, band structures of metals, semiconductors and insulators, dynamics of electron and phonons, electromagnetic and optical properties of metals and doped semiconductors, phonomenology of superconductivity and magnetism, and selected experimental methods of solid state physics.

PHYS 727. Atomic Physics. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of the instructor. Irreducible tensor methods. Radiative excitation and ionization processes. Atom-atom scattering. Time-evolution of atomic observables in external fields. Multiple channel quantum defect theory and complex atomic and molecular spectra.

PHYS 731. Advanced Seminar I. 1 Credit.
Lecture 1 hour; 1 credit. Written and oral communication skills as applied to physics. Data display techniques for scientific reports.

PHYS 732. Advanced Seminar II. 1 Credit.
Lecture 1 hour; 1 credit. Methodology of scientific information retrieval. Organization of information in selected research areas.

PHYS 750. Quantum Electronics. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: PHYS 604. Interaction of quantized electromagnetic field with matter, including photon coherence, theory of laser, nonlinear optics and selected applications.

PHYS 754. Accelerator Physics. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisites: PHYS 601, PHYS 603, and PHYS 704 or PHYS 804. Department approval required. Overview of the underlying physics of modern particle accelerators. Acceleration, beam transport, nonlinear dynamics, coherent synchrotron radiation, wakefields and impedances, collective effects, phase space cooling, free-electron lasers, novel methods of acceleration, accelerator systems.

PHYS 760. Low Temperature Physics. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PHYS 604, PHYS 707 or PHYS 807, and PHYS 721 or PHYS 821. Properties and behavior of materials and systems at low temperature. Bose and Fermi systems, superconductivity, superfluidity, condensates.

PHYS 797. Research. 1-6 Credits.

PHYS 801. Mathematical Methods of Physics II. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: PHYS 601. Group theory, Lie groups and Lie algebras, differential geometry, tensor fields on manifolds, integral calculus of differential forms.

PHYS 804. Classical Electrodynamics II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PHYS 604. Electrodynamics: Maxwell equations, plane electromagnetic waves and wave propagation, waveguides, radiating systems, special theory of relativity, including the dynamics of relativistic particles and electromagnetic fields.

PHYS 807. Statistical Mechanics. 3 Credits.
PHYS 811. Computational Physics. 3 Credits.  
Lecture 3 hours; 3 credits. Studies of high level computer languages. Computational techniques used in physics. Numerical techniques for differential and integral problems. Algebraic processing languages. Introduction to scientific visualization techniques.

PHYS 821. Quantum Mechanics II. 3 Credits.  

PHYS 822. Nuclear and Particle Physics I. 3 Credits.  
Lecture 3 hours; 3 credits. Prerequisite: PHYS 621. Nuclear forces, models of nuclear structure and reactions, hadron and lepton scattering, introduction to constituent quark model and hadron spectroscopy.

PHYS 823. Nuclear and Particle Physics II. 3 Credits.  
Lecture 3 hours; 3 credits. Prerequisite: PHYS 722 or PHYS 822. Discrete and continuous symmetries and application to particle physics, SU(2) and SU(3) symmetries and static properties of haldon. Klein-Gordon and Dirac equations, quantum electrodynamics and Feynman rules, strong and weak interactions. Standard Model and physics beyond the Standard Model.

PHYS 824. Solid State I. 3 Credits.  
Lecture 3 hours; 3 credits. Prerequisite: PHYS 621. The first part of the condensed matter course incudes electronic and lattice properties of solids, band structures of metals, semiconductors and insulators, dynamics of electron and phonons, electromagnetic and optical properties of metals and doped semiconductors, phenomenology of superconductivity and magnetism, and selected experimental methods of solid state physics.

PHYS 825. Solid State II. 3 Credits.  
Lecture, 3 hours; 3 credits. Prerequisite: PHYS 724 or PHYS 824. The second part of the condensed matter course is mostly focused on many body and collective effects in condensed matter, including phase transitions, Bose and Fermi quantum liquids, superfluidity, superconductivity and magnetism, and properties of mesoscopic and low-dimensional systems.

PHYS 827. Atomic Physics. 3 Credits.  
Lecture 3 hours; 3 credits. Prerequisite: permission of the instructor. Irreducible tensor methods. Radiative excitation and ionization processes. Atom-atom scattering. Time-evolution of atomic observables in external fields. Multiple channel quantum defect theory and complex atomic and molecular spectra.

PHYS 831. Advanced Seminar I. 1 Credit.  
Written and oral communication skills as applied to physics. Data display techniques to prepare scientific reports.

PHYS 832. Advanced Seminar II. 1 Credit.  
Lecture 1 hour; 1 credit. Methodology of scientific information retrieval. Organization of information in selected research areas.

PHYS 842. Advanced Quantum Mechanics. 3 Credits.  
Lecture 3 hours; 3 credits. Prerequisites: PHYS 704, PHYS 721. Introduction to relativistic quantum mechanics; symmetries in relativistic wave equations; solutions to relativistic wave equations for bound states and scattering processes; classical field theory and role of symmetries in construction of conserved currents; introduction to second quantization of fields.

PHYS 850. Quantum Electronics. 3 Credits.  
Lecture, 3 hours; 3 credits. Prerequisite: PHYS 604. Interaction of quantized electromagnetic field with matter, including photon coherence, theory of laser, nonlinear optics and selected applications.

PHYS 853. Atomic & Molecular Physics. 3 Credits.  

PHYS 854. Accelerator Physics. 3 Credits.  
Lecture 3 hours; 3 credits. Prerequisites: PHYS 601, PHYS 603, and PHYS 704 or PHYS 804. Department approval required. Overview of the underlying physics of modern particle accelerators. Acceleration, beam transport, nonlinear dynamics, coherent synchrotron radiation, wakefields and impedances, collective effects, phase space cooling, free-electron lasers, novel methods of acceleration, accelerator systems.

PHYS 857. Plasma Physics. 3 Credits.

PHYS 859. Classical Mechanics and Electromagnetism in Accelerator Physics. 3 Credits.  
Lecture 3 hours; 3 credits. Prerequisites: PHYS 601, PHYS 603, and PHYS 704 or PHYS 804. Further development of classical mechanics and electromagnetism and their application to accelerator physics: LaGrangian and Hamiltonian formulation of equations of motion, canonical transformations, adiabatic invariants, linear and nonlinear resonances. Liouville's theorem, solutions of Maxwell's equation in cavities and waveguides, wakefields, radiation and retarded potentials, synchrotron radiation.

PHYS 860. Low Temperature Physics. 3 Credits.  
Lecture 3 hours; 3 credits. Prerequisite: PHYS 604, and PHYS 707 or PHYS 807, and PHYS 721 or PHYS 821. Properties and behavior of materials and systems at low temperature. Bose and Fermi systems, superconductivity, superfluidity, condensates.

PHYS 861. Nuclear Physics. 3 Credits.

PHYS 862. Nuclear Physics. 3 Credits.

PHYS 871. Introduction to Quantum Field Theory. 3 Credits.  
Lecture, 3 hours; 3 credits. Prerequisites: PHYS 842. Quantization of the Klein-Gordon field, interactions in quantum field theory and Feynman diagrams, quantization of the Dirac field, quantization of the electromagnetic field, quantum electrodynamics, renormalization, quantum chromodynamics and asymptotic freedom.

PHYS 898. Doctoral Research. 1-12 Credits.

PHYS 899. Dissertation. 1-9 Credits.

POLS - Political Science

POLITICAL SCIENCE Courses

POLS 503. First Amendment Freedoms. 3 Credits.  
The course deals with the development and practice of conflicting judicial and legal theories concerning our substantive guaranties. Students are asked to act as advocates in developing and substantiating theories of their own.

POLS 510. African American Politics. 3 Credits.  
This course examines the political development of Black people in the United States by focusing on the relationship and processes of the American political system. The political dynamics of Black political thought, the Civil Rights Movement, and Black protest politics are also analyzed.

POLS 512. Politics of the Civil Rights Movement. 3 Credits.  
Examines the political activities which resulted in the passage of the nation’s second Civil Rights policy, the 1960 and 1964 Civil Rights Acts, the 1965 Voting Rights Act and the 1968 Fair Housing Act. The course analyzes the underpinnings, leadership, and political strategies of the Civil Rights Movement.

POLS 514. Politics of Education. 3 Credits.  
The question of power, often ignored by education policy analysts and researchers, is a principal focus of this seminar. Issues ranging from the role of education in political socialization and the politics of affirmative action and equal opportunity are examined.

POLS 515. Women and Politics in America. 3 Credits.  
Examines women’s place in political theory and the practice of politics in the United States. A major focus is to trace the development of women’s political rights, the impact of public policy on the lives of American women and to see how women influence and participate in the political process.
POLS 520. Southern Politics. 3 Credits.
This seminar focuses on the politics of the American South from the 1940s to the present. Emphasis is on introducing students to contrasting explanations and analysis about the politics of the American South.

POLS 521. International Law. 3 Credits.
Surveys major areas of public international law (e.g., laws of warfare, law of the sea, conflict resolution, etc.). Emphasizes the relationship between international law and international politics.

POLS 524. International Organization. 3 Credits.
Course provides a basis for understanding the role and importance of international organizations in contemporary international relations. Focuses on development and history of global organizations, with particular emphasis on the United Nations, and regional and functional organizations.

POLS 534. Political Participation in the United States. 3 Credits.
An examination of current theories and research on political behavior, conventional and unconventional modes of political participation, and the impact of participation on the political system.

POLS 535. Chinese Politics. 3 Credits.
A study of origins of the Chinese revolution; development and functions of the Chinese Communist Party; government institutions; the defense establishment; evolution of foreign policy; and post-Mao political and economic reforms.

POLS 536. Japanese Politics. 3 Credits.
A study of Japan’s historical political development and social patterns; government institutions; problems of the constitution; and foreign and defense policy.

POLS 537. International Relations in East Asia. 3 Credits.
A study of contemporary issues (political, economic, and strategic) in the East Asia area; the interactions of China, Japan, the United States, and the former Soviet republics in East Asia.

POLS 542. Twentieth Century Dictatorships. 3 Credits.
A study of the Fascist, Nazi, Stalin and Mao regimes and the forces that brought them to power and sustained them, including a study of the impact of their policies on their people and neighboring states.

POLS 566. Politics of the Middle East. 3 Credits.
An analysis of the political processes throughout the region and in selected nations of the Middle East. Topics to be discussed include inter-Arab relations, the Arab-Israeli conflict, the Iran-Iraq rivalry and foreign power involvement in the Middle East.

POLS 595. Topics in Political Science. 1-3 Credits.
The advanced study of selected topics which, due to their specialized nature, may not be offered regularly.

POLS 596. Topics in Political Science. 3 Credits.
The advanced study of selected topics which, due to their specialized nature, may not be offered regularly.

POLS 597. Independent Research in Political Science. 1-3 Credits.
Independent research in political science under the supervision of a faculty member.

POLS 602. Seminar in American Foreign Policy. 3 Credits.
The formulation and conduct of U.S. foreign policy under changing domestic and external circumstances. Models of decision making; interrelationships of economic, political, and military factors; major trends in contemporary American foreign policy making.

POLS 623. Foreign Policy Analysis. 3 Credits.
Comparative study of foreign policy behavior. Internal and external factors in formation and implementation of foreign policy. Examination and application of foreign policy models.

POLS 624. National Security Policy. 3 Credits.
Examines U.S. national security policy, strategy and the use of force, the formulation and execution of policy, the international dimension of national security, and contemporary issues in national security.

POLS 626. Seminar in Politics of Russia and the Soviet Successor States. 3 Credits.
Power and authority in Russia and the other successor states of the former Soviet Union. Although focusing on Russia, the course embraces the contemporary internal politics of the states in the space between Germany and Japan/China including Central Asia and the Caucasus. Emphasizes research methodology and strategies.

POLS 631. Seminar in Chinese Politics. 3 Credits.
An advanced survey and research on contemporary Chinese politics, political and economic reforms; intellectuals and politics; China’s experience of socialist revolution and economic construction; and foreign policy.

POLS 650. Interdependence, Power and Transnationalism. 3 Credits.
This course covers the fundamental concepts, ideas, and approaches to the study of interdependence and transnationalism. It seeks to expose students to the nature, role, and impact of economic, technological, strategic, and cultural interdependence. Cases of interdependence and transnationalism are explored in the post-Cold War era. Some focus is placed on how interdependence and transnationalism are impacting the power of the state. Prerequisites: Permission of director or instructor.

POLS 665. International Political Economy. 3 Credits.
Analysis of the forces shaping national and transnational economic institutions and their policies on a range of contemporary issues, including North-South relations.

POLS 695. Selected Topics in Political Science. 1-3 Credits.
The advanced study of selected topics which, due to their specialized nature, may not be offered regularly.

POLS 696. Selected Topics in Political Science. 1-3 Credits.
The advanced study of selected topics which, due to their specialized nature, may not be offered regularly.

POLS 697. Independent Research in Political Science. 1-3 Credits.
Independent research in political science under the supervision of a faculty member.

PORT - Maritime Ports Logistics Mgmt

MARITIME PORTS LOGISTICS MGMT Courses

PORT 610. International Shipping and Supply Chain Management. 3 Credits.
Examines international freight transportation and terms for movement of international trade; focuses on improving supply chain relationships in the movement of international trade/directing the flow of information, materials and products. (cross-listed with MSCM 610).

PORT 611. International Maritime Transport. 3 Credits.
Examines the international business of shipping, commercial processes, maritime-related organizations, shipbuilding and repair, ship types and fleets, and commodity movement. Prerequisites: an undergraduate course in the international field such as MGMT 361, MGMT 462, or a similar graduate course.

PORT 612. Port Operations and Management. 3 Credits.
Covers role, functions, and types of international terminals and ports, including design and operation of general and specialized cargo handling facilities and offshore systems, port authorities, operational structures, and labor. Prerequisites: a graduate course in management such as MGMT 602 and a course in operations management.

PORT 613. International Maritime and Admiralty Law. 3 Credits.
International law of the sea, maritime jurisdiction, regulation of shipping, carriage of goods, marine insurance, salvage, marine environmental law, safety at sea, and the Oil Pollution Act of 1990 are covered, along with other maritime laws. Prerequisites: a basic law course.
PORT 614. Port Planning and Economics. 3 Credits.
Port planning and competition, ports and ocean container shipping, port impacts, port users in theory, port operator costing and pricing, port carriers and shippers, government and maritime institutions, dockworkers, port environment and port performance evaluation. Prerequisites: a course in microeconomics such as ECON 604.

PORT 615. Maritime Security and Risk Analysis. 3 Credits.
An overview of international and U.S initiatives to ensure the security of vessels, cargo, people, and infrastructure within the maritime domain. In addition to the impacts of regulatory requirements on maritime commerce, the course also addresses maritime threats to the international economy (including maritime piracy and maritime terrorism), maritime coalitions, and state-of-the-art techniques and tools for safeguarding oceanborne commerce. (cross-listed with MSCM 615).

PORT 616. Supply Chain and Reverse Logistics. 3 Credits.
This course explores theories of global Supply Chain and Reverse Logistics systems as well as the practices, risks and opportunities found in today’s systems. Fundamental tools and techniques will be used to provide insights on how to best organize, manage, and optimize such systems. (cross-listed with MSCM 616).

PORT 617. Transportation Intermediaries. 3 Credits.
An overview of the document, role and functions of transportation intermediaries. The relationships between intermediaries, carriers and shippers are discussed as well as the major intermediaries and their competitive strategies. The customers of various international trade and supply chains of intermediaries are also discussed. (cross-listed with MSCM 617).

PORT 618. Shipbuilding and Ship Repair Business Management. 3 Credits.
Examines the shipbuilding and ship repair industry from the perspective of industry economics, industry financial management and repair operations and acquisition processes. Provides industry professionals with business management practices that shape the industry.

PORT 619. Marine Insurance. 3 Credits.
Examines the rise of Lloyd’s and the London Insurance Market, the current maritime insurance market, principles of insurance and law, Hull Insurance Law, cargo insurance, general average and salvage insurance.

PORT 668. Directed Research/Port Internship. 1-3 Credits.
1-3 credits. Prerequisites: PORT 611, 612, 613, and 614. Practical field experience in international maritime, ports and logistics related challenges through supervised investigation and analysis of a problem or a working internship within the port-related arena.

PORT 695. Selected Topics in Maritime and Port Management. 3 Credits.
3 credits. Prerequisites: PORT 611 or 612. The advanced study of selected topics not offered on a regular basis.

PORT 697. Independent Study. 3 Credits.
3 credits. Designed to provide the opportunity for independent study under the guidance of a member of the faculty.

PPCM - Public Procurement and Contract Management

PPCM 718. Public Sector Contract Administration. 3 Credits.
Examines public sector contracting including preliminary design of contracts, contract budgeting, developing specifications, scope of services, bid solicitation, RFPs, evaluation of bids, and awarding and administering contracts. Reviews state and federal laws pertaining to governmental contracting, and examines minority procurement programs.

PPCM 726. Introduction to Public Procurement. 3 Credits.
This course provides an overview of public procurement as a basic functional area of government. Specific focus on the context of public-private contracting arrangements, scope of public procurement, including organizational structures, regulations, process and methods, and current issues in public procurement.

PPCM 728. Public Sector Contract Planning and Formation. 3 Credits.
This course covers all phases of the contract formulation process with a focus on the RFF and RFB procedure, documents, and other technical issues.

PPCM 731. Public Sector Procurement Law and Ethics. 3 Credits.
This course surveys the law and ethics that apply to public sector procurement in the United States.

PRTS – Parks, Recreation and Tourism Studies

PARKS, RECREATION/TOURISM STUDIES Courses

PRTS 561. The Tourism and Hospitality Industry. 3 Credits.
Prerequisites: permission of instructor. This course explores tourism from a social perspective. The focus of the course will be on economic and social dimensions of tourism, tourism development strategies, and current research in hospitality from national and international case studies.

PRTS 575. Tourism and Cultural Heritage Management. 3 Credits.
This course examines the principles and practices of planning, marketing, and managing cultural tourism. Assessment, development, and maintenance of cultural tourism products are explored.

PRTS 595. Topics. 1-3 Credits.
This course provides an opportunity for in-depth study of selected topics in the variety of areas comprising parks, recreation and tourism studies.

PRTS 619. Strategic Marketing in Parks, Recreation and Tourism. 3 Credits.
Course is designed to examine the principles and practices of strategic marketing as it pertains to tourism planning and development. The course will explore market analysis in segmenting and identifying specified tourist markets.

PRTS 638. Fiscal Planning and Management in Sport and Recreation. 3 Credits.
This course is designed to examine the principles and practices of financial management in diverse sport and recreation service settings. This course will explore the basic concepts of financial planning and analysis required to effectively manage a successful operation. (cross-listed with SMGT 638).

PRTS 650. Readings in Contemporary Issues in Recreation, Sport, Health and Physical Education. 3 Credits.
Literature and research on ethical issues in sport, recreation, and wellness settings. Emphasis will be placed on administrative ethical decision-making skills and practices.

PRTS 660. Legal Aspects of Sport. 3 Credits.
Course will introduce students to various aspects of the legal system as it relates to the management and supervision of recreation and sport facilities, programs, participants, spectators and events.

PSYC - Psychology

PSYCHOLOGY Courses

PSYC 521. Quantitative I. 3-4 Credits.
PSYC 564. Psychological Assessment II. 3-4 Credits.
PSYC 651. Developmental Psychology. 3 Credits.
Lecture and discussion 3 hours; 3 credits. This course covers topics related to the physical, cognitive, social and emotional aspects of growth, from conception to death. It focuses on human growth and development, but other organisms are also considered.
PSYC 653. Personality Psychology: Theory and Research. 3 Credits.
Lecture and discussion 3 hours; 3 credits. The course deals with basic issues and contemporary topics in personality research. The basic issues covered include personality measurement, heredity, biological approaches, personality development, and motives. Current topics in personality research that are covered include the unconscious, personal efficacy, sex and gender, control, self-concept, stress and illness, sexuality, and disorders of personality.

PSYC 661. Psychopathology. 3 Credits.
The course provides a conceptual basis for the study of abnormal behavior. Students conduct an in-depth review of the literature related to the classification, etiology, and treatment of mental disorders.

PSYC 662. Human-Computer Interface Design. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing and permission of the instructor. Course introduces students to the fundamental principles of human-computer interaction. Exposes students to basic psychological concepts and shows how they are used to create effective interface designs. Covers both theoretical and practical aspects of interface design.

PSYC 663. Intellectual Assessment. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Primary focus is on intellectual assessment for children and adults. Basic instruction in administration and interpretation of standard tests of intelligence will be provided. Additional topics include tests of achievement and memory function.

PSYC 664. Personality Assessment. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Course covers major methods of personality assessment including objective and projective instruments. Emphasis is on current theory and applications of personality assessment.

PSYC 667. Practicum in Psychology. 2-5 Credits.
2-5 credits. Prerequisites: 15 graduate course hours (including PSYC 663) and permission of the instructor. Students will receive supervised training in an applied setting in the area of clinical or industrial psychology.

PSYC 696. Topics in Psychology. 3 Credits.
PSYC 697. Selected Topics in Psychology. 1-4 Credits.
1-3 credits. Prerequisites: permission of the instructor and graduate program director. This course provides opportunities for advanced investigations of selected topics in psychology. May be taken by students beyond the first year of graduate study who wish to pursue topics not covered by regularly scheduled courses.

PSYC 698. Research in Psychology. 3 Credits.
3 credits. Individual project under guidance of a research advisor. Required for students choosing thesis option. Limited to a total of 3 hours of credit.

PSYC 699. Thesis. 1-3 Credits.
1-3 credits. Prerequisite: PSYC 698. Individual project under guidance of a research advisor. Required for students choosing thesis option.

PSYC 712. History and Systems of Psychology. 3 Credits.
Lecture and discussion 3 hours; 3 credits. A survey of the historical roots of modern psychology.

PSYC 713. Research Fundamentals. 2 Credits.
Lecture 2 hourS; 2 credit. This course will cover Responsible Conduct of Research, including completion of CITI course, protection of human subjects, University Human Subjects Committee and IRB, APA Style, paper structure, references, tables, figures, etc., research proposal writing, including searching for sources, writing, oral presentation, data collection and management issues, (e.g., Inquisit, SONA, data cleaning). Students are required to complete a Research Proposal with Introduction and Methods and Data Analysis Plan. Oral presentation of research proposal.

PSYC 722. Occupational Health Psychology. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: PSYC 763/863 and PSYC 850. This course examines multidisciplinary research and theories on issues related to individual and organizational well-being and health. Occupational health psychology (OHP) emphasizes the promotion of wellness and the prevention of injuries and illnesses in the workplace. Through lectures/presentations, discussions, and research activities, students will learn about OHP theory and practice.

PSYC 727. Analysis of Variance and Experimental Design. 4 Credits.
4 credits; 3 Lecture hours; 2 Lab hours. Prerequisite: admission into the psychology M.S. or Ph.D. program or permission of the instructor. Review of the basic descriptive and inferential statistical procedures with a heavy emphasis on fundamental and advanced analysis of variance techniques. Topics include contrasts, factorial designs, within-subject and mixed designs, and analysis of covariance. Course materials are covered in the context of classical experimental and quasi-experimental design.

PSYC 728. Regressional and Correlational Design. 4 Credits.
Lecture 3 hours; Lab 2 hours; 4 credits. Prerequisite: admission into the psychology M.S. or Ph.D. program or permission of the instructor and PSYC 727/827 or equivalent. Course covers correlation with heavy emphasis on regression analysis in the context of the general linear model. Topics include partial correlations, categorical and continuous interactions, non-linear regression, and multivariate statistics. Course materials are covered in the context of correlational designs and survey research.

PSYC 730. Teaching Statistics and Research Practicum. 1,3 Credit.
1 or 3 credits. Prerequisites: PSYC 727 or 824 and 827 and PSYC 728 or 825 or 828. Advanced graduate students in Psychology will have the opportunity to direct statistics and research methods labs for graduate statistics courses. Students’ main role will be acting as peer mentors for the new graduate students. Other possible responsibilities may include grading, creating lab activities and assignments, and supervising students’ research projects. Students will be evaluated on their teaching effectiveness and performance.

PSYC 731. Human Cognition. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: admission into the psychology M.S. or Ph.D. program or permission of the instructor. An investigation of the ways in which people process and retain information, make decisions, and solve problems. Current models of structures and processes of human memory and cognition are discussed with particular emphasis on neurocognitive evidence of the brain mechanisms involved in cognition.

PSYC 735. Health Psychology. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on contemporary theory and research topics in health psychology. The course examines psychological and behavioral issues affecting health maintenance, coping with life-threatening illnesses and chronic diseases, and health promotion. The course uses the biopsychosocial (mind-body) model as an organizing framework, emphasizing the dynamic interactions among biological, social, personality, and behavioral factors jointly in influencing people’s health. The course is conducted as a seminar.

PSYC 736. Multilevel Models: HLM. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite PSYC 728/828 or equivalent. Social science data frequently have a hierarchical or multilevel structure as a consequence of sampling designs or repeated measures. The purpose of the course is to introduce students to the basic principles and applications of hierarchical linear modeling in social science research. Topics covered include an introduction to multilevel analyses, random intercept models, random slope models, hypotheses testing, hierarchical models for limited dependent variables, model fitting, three-level models, and repeated-measures applications.

PSYC 740. Quasi-Experimental Methods. 3 Credits.
Lecture, 3 hours, 3 credits. Quasi-experimental methods is a course to teach techniques for research designs not conducive to randomized-control trials. The philosophy of these techniques, issues of validity, and analyses are discussed. Comparisons with randomized-control trials as well as means to strengthen quasi-methodologies for better general causal inferences are presented.

PSYC 741. Sensation and Perception. 3 Credits.
Lecture and discussion 3 hours; 3 credits. A survey of human sensation and perception emphasizing historical contributions, recent theoretical and methodological developments, and empirical findings.
PSYC 744. Program Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: 727/827 and 728/828 (or current enrollment). This course is designed to introduce students to the field of program evaluation as well as to give students practical experience conducting a program evaluation. Students will get experience creating and conducting qualitative and quantitative assessments. A course goal is to work in small groups to conduct a program evaluation.

PSYC 745. Psychometric Theory. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: PSYC 728/828 or equivalent. This course introduces classical test theory, including definitions and formulas for test reliability, standard error of measurement, and related statistics. Additional topics include scaling, test validity, item statistics useful in test constructions, and norms commonly used in educational and psychological testing. Generalizability Theory, factor analysis, and Item Response Theory are introduced.

PSYC 746. Structural Equation Modeling. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PSYC 745/845 or equivalent. This course covers the topics of linear structural equation modeling and focuses on estimation, measurement models, confirmatory and hierarchical factor analysis, structural equations, longitudinal models, multisample analyses, and mean structures.

PSYC 747. Multivariate Methods for the Social/Behavioral Sciences. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PSYC 728/828 or equivalent. The course is focused on methods and techniques for analyzing multivariate data. Emphasis includes both conceptual and computational aspects of the most commonly used analytical tools when experimental units have multiple measures. A goal of the course is to avoid the extremes of “plug n chug” analyses on the one hand and theorems and proofs on the other to provide generalizable working knowledge of multivariate statistics. Featured techniques are MANOVA, MANCOVA, profile analysis, discriminant analysis, canonical correlation, principal components analysis, and exploratory factor analysis.

PSYC 748. Categorical Methods for the Social/Behavioral Sciences. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: PSYC 727/827 or PSYC 728/828. The purpose of this course is to review the linear regression model and move into categorical methods. Featured methods are inference using proportions and odds ratios, multi-way contingency tables, logistic regression, and loglinear models. The generalized linear model is also introduced.

PSYC 749. Advanced Social Psychology. 3 Credits.
Lecture and discussion 3 hours; 3 credits. This course discusses the behavior of the human as a member of a group. Topics include attitude theory and change, interpersonal attraction, group dynamics, and related theory and applied research techniques.

PSYC 750. Organizational Psychology. 3 Credits.
Lecture and discussion 3 hours; 3 credits. This course provides an overview of organizational behavior and theory. Topics include leadership, motivation, teams, social processes at work, workplace relationships, organization structure and environments, and organizational development and change.

PSYC 763. Personnel Psychology. 3 Credits.
Lecture and discussion 3 hours; 3 credits. This course provides an overview of personnel psychology. Topics include reliability and validity, job analysis, performance criteria, performance appraisal, employee recruitment, employee selection, and training and development.

PSYC 770. Human Factors Psychology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: PSYC 731/831 and 741/841 or equivalents or permission of the instructor. The application and evaluation of psychological principles and research relating human behavior to the design of tools, technology, and the work environment. Theory, methods, and application are emphasized.

PSYC 771. Ergonomics. 3 Credits.
Lecture 3 hours; 3 credits. Basic overview and application of anthropometry, biomechanics, functional anatomy, mechanics, and human physiology for the design of industrial tools, equipment, and workstations.

PSYC 780. Ethics, Professional Standards, and Responsible Conduct. 3 Credits.
Lecture, 3 hours; 3 credits. Ethical principles, APA codes, laws, policies and approaches to ethical decision making will be applied to case studies involving dilemmas and issues in several areas of the professional activities of psychologists. Students will prepare an ethical and/or professional issue paper and a self-reflection on acculturation into professional ethics and standards.

PSYC 781. Advanced Ergonomics. 3 Credits.
Lecture, 3 hours; 3 credits. Basic overview of the application of anthropometry, biomechanics, ergonomics, cognition and perception within workplace environments. Particular focus on the analysis and prevention of accidents at work. Course requires considerable practice in technical writing.

PSYC 792. Advanced Seminar in Physiological Psychology. 3 Credits.
Lecture 3 hours; 3 credits. Students will investigate the biological underpinnings of behavior and explore what is currently known about their role in movement, emotions, mental illness, sexual behavior, memory, states of consciousness, sensory perception, thought and language, and several neuro-psychiatric disorders. Through active learning exercises, i.e., class discussion, reports, critiques, oral presentations, and a final research paper or proposal, students will apply and demonstrate their acquired knowledge and critical thinking skills to the biological basis of human behavior.

PSYC 795. Topics in Psychology I. 1-4 Credits.
PSYC 796. Topics in Psychology II. 1-4 Credits.
PSYC 801. Empirically-Supported Therapies. 3 Credits.
Lecture, 3 hours; 3 credits. Empirically-Supported Therapies is designed to foster the integration of clinical science and the practice of psychotherapy. Course objectives include learning how to identify, evaluate, and implement empirically supported interventions for various psychological disorders.

PSYC 810. Seminar in Professional Aspects of Industrial/Organizational Psychology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: admission into the I/O Ph.D. program. Topics covered include standards of professional behavior of I/O psychologists, the governance of psychology, I/O psychology professional associations, and professional opportunities for I/O psychologists.

PSYC 812. History and Systems of Psychology. 3 Credits.
Lecture and discussion 3 hours; 3 credits. A survey of the historical roots of modern psychology.

PSYC 813. Research Project I. 2 Credits.
Lecture 2 hours; 2 credits. This course will cover Responsible Conduct of Research, including completion of CITI course, protection of human subjects, University Human Subjects Committee and IRB, APA Style, paper structure, references, tables, figures, etc., research proposal writing, including searching for sources, writing, oral presentation, data collection and management issues, (e.g., Inquisite, SONA, data cleaning). Students are required to complete a Research Proposal with Introduction and Methods and Data Analysis Plan. Oral presentation of research proposal.

PSYC 815. Teaching Psychology. 1 Credit.
Lecture and discussion 1 hour; 1 credit. Seminar on the pedagogy of teaching as applied to the discipline of psychology. Topics include syllabus preparation, lecture and discussion methods, assessment and grading, and teaching portfolio development.

PSYC 822. Occupational Health Psychology. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: PSYC 763/863 and PSYC 850. This course examines multidisciplinary research and theories on issues related to individual and organizational well-being and health. Occupational health psychology (OHP) emphasizes the promotion of wellness and the prevention of injuries and illnesses in the workplace. Through lectures/presentations, discussions, and research activities, students will learn about OHP theory and practice.
PSYC 824. ODU-Research Methods I-Variance and Experimental Design. 4 Credits.
Review of basic descriptive and inferential statistical procedures with a heavy emphasis on fundamental and advanced analysis of variance techniques. Topics include contrasts, factorial designs, within-subject and mixed designs, and analysis of covariance. Course materials are covered in the context of classical experimental and quasi-experimental design. Prerequisites: admission into Virginia Consortium PhD in Clinical Psychology program or permission of the instructor.

PSYC 825. ODU Research Methods II: Regression and Correlational Design. 4 Credits.
Course covers correlation with heavy emphasis on regression analysis in the context of the general linear model. Topics include partial correlations, categorical and continuous interactions, non-linear regression, and multivariate statistics. Course materials are covered in the context of correlational designs and survey research. Prerequisites: admission into Virginia Consortium PhD in Clinical Psychology or permission of the instructor.

PSYC 827. Analysis of Variance and Experimental Design. 4 Credits. 4 credits; 3 Lecture hours; 2 Lab hours. Prerequisite: admission into the psychology M.S. or Ph.D. program or permission of the instructor. Review of the basic descriptive and inferential statistical procedures with a heavy emphasis on fundamental and advanced analysis of variance techniques. Topics include contrasts, factorial designs, within-subject and mixed designs, and analysis of covariance. Course materials are covered in the context of classical experimental and quasi-experimental design.

PSYC 828. Regressional and Correlational Design. 4 Credits.
Lecture 3 hours; Lab 2 hours; 4 credits. Prerequisite: admission into the psychology M.S. or Ph.D. program or permission of the instructor and PSYC 727/827 or equivalent. Course covers correlation with heavy emphasis on regression analysis in the context of the general linear model. Topics include partial correlations, categorical and continuous interactions, non-linear regression, and multivariate statistics. Course materials are covered in the context of correlational designs and survey research.

PSYC 830. Teaching Statistics and Research Practicum. 1, 3 Credit.
1 or 3 credits. Prerequisites: PSYC 727 or 824 or 827 and PSYC 728 or 825 or 828. Advanced graduate students in Psychology will have the opportunity to direct statistics and research methods labs for graduate statistics courses. Students’ main role will be acting as peer mentors for the new graduate students. Other possible responsibilities may include grading, creating lab activities and assignments, and supervising students’ research projects. Students will be evaluated on their teaching effectiveness and performance.

PSYC 831. Human Cognition. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: admission into the psychology M.S. or Ph.D. program or permission of the instructor. An investigation of the ways in which people process and retain information, make decisions, and solve problems. Current models of structures and processes of human memory and cognition are discussed with particular emphasis on neurocognitive evidence of the brain mechanisms involved in cognition.

PSYC 833. Grant and Manuscript Writing. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: admission to the doctoral program in psychology and completion of master’s thesis, or permission of instructor. The course is designed: (1) to teach students to write article-length scholarly manuscripts in APA format of publishable quality, and (2) to teach students the critical components of grant applications. By the end of this course, each student will have prepared a manuscript that is ready for submission to a peer-reviewed journal and have completed sections of a federal grant application.

PSYC 835. Health Psychology. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on contemporary theory and research topics in health psychology. The course examines psychological and behavioral issues affecting health maintenance, coping with life-threatening illnesses and chronic diseases, and health promotion. The course uses the biopsychosocial (mind-body) model as an organizing framework, emphasizing the dynamic interactions among biological, social, personality, and behavioral factors jointly in influencing people’s health. The course is conducted as a seminar.

PSYC 836. Multilevel Models: HLM. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite PSYC 728/828 or equivalent. Social science data frequently have a hierarchical or multilevel structure as a consequence of sampling designs or repeated measures. The purpose of the course is to introduce students to the basic principles and applications of hierarchical linear modeling in social science research. Topics covered include an introduction to multilevel analyses, random intercept models, random slope models, hypotheses testing, hierarchical models for limited dependent variables, model fitting, three-level models, and repeated-measures applications.

PSYC 840. Quasi-Experimental Methods. 3 Credits.
Lecture, 3 hours. 3 credits. Quasi-experimental methods is a course to teach techniques for research designs not conducive to randomized-control trials. The philosophy of these techniques, issues of validity, and analyses are discussed. Comparisons with randomized-control trials as well as means to strengthen quasi-methodologies for better general causal inferences are presented.

PSYC 841. Sensation and Perception. 3 Credits.
Lecture and discussion 3 hours; 3 credits. A survey of human sensation and perception emphasizing historical contributions, recent theoretical and methodological developments, and empirical findings.

PSYC 844. Program Evaluation. 3 Credits.
Lecture 3 hours;3 credits. Prerequisite: 727/827 and 728/828 (or current enrollment). This course is designed to introduce students to the field of program evaluation as well as to give students practical experience conducting a program evaluation. Students will get experience creating and conducting qualitative and quantitative assessments. A course goal is to work in small groups to conduct a program evaluation.

PSYC 845. Psychometric Theory. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: PSYC 728/828 or equivalent. This course introduces classical test theory, including definitions and formulas for test reliability, standard error of measurement, and related statistics. Additional topics include scaling, test validity, item statistics useful in test constructions, and norms commonly used in educational and psychological testing. Generalizability Theory, factor analysis, and Item Response Theory (IRT) are introduced.

PSYC 846. Structural Equation Modeling. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PSYC 745/845 or equivalent. This course covers the topics of linear structural equation modeling and focuses on estimation, measurement models, confirmatory and hierarchical factor analysis, structural equations, longitudinal models, multisample analyses, and mean structures.

PSYC 847. Multivariate Methods for the Social/Behavioral Sciences. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PSYC 728/828 or equivalent. The course is focused on methods and techniques for analyzing multivariate data. Emphasis includes both conceptual and computational aspects of the most commonly used analytical tools when experimental units have multiple measures. A goal of the course is to avoid the extremes of “plug n chug” analyses on the one hand and theorems and proofs on the other to provide generalizable working knowledge of multivariate statistics. Featured techniques are MANOVA, MANCOVA, profile analysis, discriminant analysis, canonical correlation, principal components analysis, and exploratory factor analysis.
PSYC 848. Categorical Methods for the Social/Behavioral Sciences. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: PSYC 727/827 or PSYC 728/828.
The purpose of this course is to review the linear regression model and move into categorical methods. Featured methods are inference using proportions and odds ratios, multi-way contingency tables, logistic regression, and loglinear models. The generalized linear model is also introduced.

PSYC 849. Advanced Social Psychology. 3 Credits.
Lecture and discussion 3 hours; 3 credits. This course discusses the behavior of the human as a member of a group. Topics include attitude theory and change, interpersonal attraction, group dynamics, and related theory and applied research techniques.

PSYC 850. Organizational Psychology. 3 Credits.
Lecture and discussion 3 hours; 3 credits. This course provides an overview of organizational behavior and theory. Topics include leadership, motivation, teams, social processes at work, workplace relationships, organization structure and environments, and organizational development and change.

PSYC 851. Micro Organizational Psychology. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: PSYC 750/850 or permission of the instructor. The study of individual and group behavior in organizations. Emphasis is placed on classic and contemporary leadership and motivation theory and research.

PSYC 853. Macro Organizational Psychology. 3 Credits.
Lecture and discussion 3 hours; 3 credits. This class uses a multilevel perspective to provide a foundation in organization theory. Students develop a theory of organizing that incorporates variables at the individual, dyad, group, unit organization, and organization network levels of analysis.

PSYC 854. Organizational Development and Change. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisites: PSYC 851 and 853 or permission of the instructor. This seminar discusses models and theories of organizational change and interventions that are commonly used to foster organizational development and effectiveness. Students participate in an organizational consulting project to apply lessons learned in the classroom.

PSYC 855. Field Research Methods in Organizational Psychology. 3 Credits.
Lecture, discussion, and field research project; 3 credits. Prerequisite: admission into the I/O Ph.D. program or permission of the instructor. This seminar discusses the design and analysis of surveys, quasi-experiments, questionnaires, interviews and other methods for studying organizational processes. Both quantitative and qualitative research methods are discussed.

PSYC 858. ODU Clinical and Ethical Issues. 1 Credit.
Lecture 1 hour; 1 credit. Weekly seminars address professional and ethical issues in the practice of clinical psychology.

PSYC 859. ODU-Cognitive and Behavioral Therapies. 3 Credits.
Lecture 3 hours; 3 credits. Covers theory and techniques of cognitive and behavioral approaches. Applications for the assessment and treatment of adults, children, couples, and families are discussed. Students gain practical experience in these techniques as well as case conceptualizational skills.

PSYC 860. ODU Practicum in Clinical Psychology. 3 Credits.

PSYC 861. ODU Advanced Practicum in Clinical Psychology. 3-6 Credits.

PSYC 862. ODU Psychodynamic Therapy. 3 Credits.

PSYC 863. Personnel Psychology. 3 Credits.
Lecture and discussion 3 hours; 3 credits. This course provides an overview of personnel psychology. Topics include reliability and validity, job analysis, performance criteria, performance appraisal, employee recruitment, employee selection, and training and development.

PSYC 864. Human Resource Development. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: PSYC 763/863 or permission of the instructor. This course covers research findings, methodologies, and evaluation designs for the training and development of personnel in organizations. Specific topics include needs assessment, learning principles and system design.

PSYC 865. Psychology of Personnel Selection. 3 Credits.
This course covers the topics of recruitment, job performance, interviews, internet-based testing, and psychological constructs for use in employee selection (e.g., intelligence, personality). Prerequisite: PSYC 763/PSYC 863 or permission of the instructor.

PSYC 866. Advanced Personnel Psychology II. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: PSYC 865 or permission of the instructor. This course covers statistical and theoretical issues related to the research and practice of personnel psychology, including meta-analysis, significance testing, aggregation issues, scale development and validation, utility, the fairness and bias of tests, and the legal context of selection.

PSYC 867. Human Performance Assessment. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisites: PSYC 763/863 or permission of the instructor. This course covers the job analysis and performance appraisal/management (PA/MA). Specific topics include job analysis methods; use of job analysis results for various HR functions; performance assessment/appraisal methods; multi-source feedback; employee reactions to and use of PA/MA information; rater cognitive processes and affect; rater goals, bias, and accuracy; and organizational practical and legal issues surrounding job analysis and PA/PM.

PSYC 870. Human Factors Psychology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: PSYC 731/831 and 741/841 or equivalents or permission of the instructor. The application and evaluation of psychological principles and research relating human behavior to the design of tools, technology, and the work environment. Theory, methods, and application are emphasized.

PSYC 871. Ergonomics. 3 Credits.
Lecture 3 hours; 3 credits. Basic overview and application of anthropometry, biomechanics, functional anatomy, mechanics, and human physiology for the design of industrial tools, equipment, and workstations.

PSYC 872. Methods, Measures, Techniques, and Tools in Human Factors. 3 Credits.
Lecture 3 hours; 3 credits. Experiential survey of methods, measures, techniques, and prototyping tools available for human factors investigations in laboratory and field settings. The design and execution of experimental investigations utilizing the measures and tools are emphasized.

PSYC 873. ODU Biological Bases of Behavior. 3 Credits.

PSYC 874. ODU Biological Bases III: Drugs and Behavior. 3 Credits.
Lecture 3 hours; 3 credits. This course deals with substance abuse disorders, identification/diagnosis, etiology, treatment and recovery. It also covers the proper use of and desired effects and side effects of medications used in the treatment of psychiatric disorders.

PSYC 875. Advanced Visual Perception and Visual Displays. 3 Credits.
Lecture 3 hours; 3 credits. Detailed review of the physiological bases of visual perception, the capabilities and limitations of the visual systems, and the metrics involved in vision research. A survey of current advanced visual displays is presented, stressing the interaction of the characteristics of these displays with the capabilities and limitations of the human visual system.

PSYC 876. Human-Computer Interaction. 3 Credits.
Lecture 3 hours; 3 credits. Review of the physical, cognitive, and performance capabilities and limitations of humans as they interact with modern computer systems. Emphasis is placed on the tools, techniques and procedures for the assessment and effective design of computer hardware, software and displays of information.

PSYC 877. Theories, Models and Simulations in Human Factors. 3 Credits.
Lecture 3 hours; 3 credits. Survey of the historical and philosophical bases for the use of theories, models, and simulations in human factors applications with a critical evaluation of existing theories, mathematical and cognitive models, and simulations in terms of actual and potential contributions to the field.
PSYC 878. Advanced Cognition and Information Processing. 3 Credits.
Lecture 3 hours; 3 credits. Historical survey of human information processing literature, detailed review of recent developments in cognitive psychology, and examination of the purposes, role and scope of cognitive engineering.

PSYC 879. Careers. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisites: PSYC 750/850 and PSYC 851 or permission of instructor. This course covers the developmental processes, facilitators, and barriers individuals encounter in their work lives. It provides a theoretical foundation in the careers literature and introduces contemporary research in the area. Work-family conflict, mentoring, organizational socialization, and career success are among the topics covered.

PSYC 880. Ethics, Professional Standards, and Responsible Conduct. 3 Credits.
Lecture, 3 hours; 3 credits. Ethical principles, APA codes, laws, policies and approaches to ethical decision making will be applied to case studies involving dilemmas and issues in several areas of the professional activities of psychologists. Students will prepare an ethical and/or professional issue paper and a self-reflection on acculturation into professional ethics and standards.

PSYC 881. Advanced Ergonomics. 3 Credits.
Lecture, 3 hours; 3 credits. Basic overview of the application of anthropometry, biomechanics, ergonomics, cognition and perception within workplace environments. Particular focus on the analysis and prevention of accidents at work. Course requires considerable practice in technical writing.

PSYC 882. Attention and Human Performance. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: PSYC 870. Survey of theories of attention, factors that influence human performance, and human performance assessment in human-machine systems. Topics include dual-task performance, vigilance, workload, arousal, fatigue, stress, human error, psychophysiology, and neuroergonomics.

PSYC 883. Research in Clinical Psychology. 2 Credits.
Individual second-year clinical research project under guidance of research advisor. Prerequisite: PSYC 713 or PSYC 813.

PSYC 889. Research in Clinical Psychology. 2 Credits.
2 credits. Individual project under guidance of a research advisor.

PSYC 890. ODU Internship in Clinical/Community Psychology. 4 Credits.
4 credits each semester for 3 semesters. Prerequisite: Permission of the clinical director. Must be enrolled in psychology doctorate program.

PSYC 891. Industrial/Organizational Internship. 1 Credit.

PSYC 892. Advanced Seminar in Physiological Psychology. 3 Credits.
Lecture 3 hours; 3 credits. Students will investigate the biological underpinnings of behavior and explore what is currently known about their role in movement, emotions, mental illness, sexual behavior, memory, states of consciousness, sensory perception, thought and language, and several neuro-psychiatric disorders. Through active learning exercises, i.e., class discussion, reports, critiques, oral presentations, and a final research paper or proposal, students will apply and demonstrate their acquired knowledge and critical thinking skills to the biological basis of human behavior.

PSYC 894. ODU Clinical Dissertation. 1-6 Credits.
1-6 credits each semester for variable credit.

PSYC 895. Topics in Psychology I. 1-4 Credits.

PSYC 896. Topics in Psychology II. 1-4 Credits.

PSYC 897. Individual Study (Readings). 1-4 Credits.

PSYC 898. Research. 3 Credits.

PSYC 899. Dissertation. 1-9 Credits.
1-9 credits per semester with limitation of a total of 24 credits. The following courses are Clinical Psychology Doctorate courses and require enrollment in that program or permission of the clinical director.

PSYC 899. PSYC 999. 1 Credit.
1 credit. A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

PT - Physical Therapy

PHYSICAL THERAPY Courses

PT 621. Introduction to Physical Therapy. 2 Credits.
Students will be exposed to basic medical terminology, patient management skills involving draping, positioning, transfers, and gait training with assistive devices.

PT 627. Theory and Practice I. 4 Credits.
Several instructional units introduce the student to the basic areas of physical therapy. Units include orientation to the profession, basic safety procedures, physical modalities of heat and cold, electrotherapy, bandaging and sterile technique, and massage.

PT 628. Theory and Practice II. 4 Credits.
Instructional units in this course include introduction of therapeutic exercise approaches for patient types with differing diagnoses. Through critical thinking and problem solving, students learn how to design specific exercise approaches based upon the goals developed for various diagnostic groups. They also learn how to assess the effectiveness, success, and potential risks associated with exercise and develop strategies to modify the treatments based upon those factors.

PT 630. Concepts in Histology for Physical Therapy. 1 Credit.
The emphasis in this course in histology is on connective tissue, muscle tissue, tissues of the nervous system as well as the skeletal system. The course is intended to give the physical therapy student a basic understanding of cell structure and function in these major systems. The course integrates with human anatomy and neuroscience.

PT 634. Clinical Sciences I. 3 Credits.
A series of lectures designed to acquaint the student with the clinical areas related to pathological conditions frequently seen in physical therapy practice. The course develops an understanding of the disease processes and guides the student in the application and analysis of pathology in the care of the patient.

PT 635. Clinical Sciences II. 3 Credits.
This course is designed to acquaint the student with medical aspects and pathological conditions associated with musculoskeletal and cardiopulmonary disease and disorders. Subunits also include presentations on cancer, hospice care, and hematological disorders.

PT 638. Exercise Physiology. 2 Credits.
This course provides an overview of human physiology as it relates to exercise and the clinical practice of physical therapy. Energy systems and cardiopulmonary physiology will be covered, including electrocardiogram interpretation, as well as resistance training and weight loss.

PT 640. Patient Evaluation I. 3 Credits.
A beginning course in patient examination skills which focuses on documentation, vital signs and history/interviewing skills, Respiratory and cardiac examination, range of motion, surface anatomy palpation, reflex testing, and vascular status assessment are introduced.

PT 641. Patient Evaluation II. 3 Credits.
A continuation of the study of patient evaluation. The focus of this course is on the musculoskeletal respiratory and cardiovascular systems, and includes examination of posture and gait.

PT 655. Clinical Problem Solving I. 2 Credits.
Use of case discussions, sample patients, and small group experiences to challenge student’s abilities to apply information from class to actual patient problems.
PT 656. Clinical Problem Solving II. 2 Credits.
Use of case discussions, sample patients and small group experience to challenge student’s abilities to apply information from spring semester classes to actual patient problems. For this course, the emphasis is on therapeutic exercise, cardiopulmonary rehabilitation, and care of the acutely ill patient.

PT 665. Biomechanics/Kinesiology I. 3 Credits.
This course will review the musculoskeletal system with emphasis on normal movement of the spine and extremities and the coordinated muscle activity necessary to produce that movement. Students will learn manual muscle testing techniques. The course will also introduce basic concepts such as types of muscle contractions, torque production, and joint reaction forces.

PT 666. Biomechanics/Kinesiology II. 2 Credits.
Students will learn to assess the measurement of motion and forces in normal human movement. Trigonometry will be employed in the problem-solving section of the course as the student assesses forces, vectors and loads.

PT 669. Clinical Internship I. 4 Credits.
This first full-time clinical education period begins at the end of the first academic year of the program and is designed to permit progressive responsibility in patient evaluation and treatment based upon material learned in classes during the first year. Each student is required to provide one in-service presentation during the clinical learning experience.

PT 695. Topics in Physical Therapy. 1-3 Credits.
Advanced study of selected topics.

PT 792. Neuroscience I. 3 Credits.
Neuroscience I is the first in a series of courses that provide the student with an understanding of integrated neuroanatomy and neurophysiology. Emphasis will be placed upon basic neurophysiologic principles at the cellular level. Prerequisites: BIOL 889.

PT 793. Neuroscience II. 3 Credits.
Neuroscience II is the second course in the sequence. From the foundation of Neuroscience I, the course will build to the progressively higher order of structural functional relationships that control behavior. Prerequisites: PT 792 and BIOL 889.

PT 810. Scientific Inquiry I. 3 Credits.
This is the first in a series of courses that prepare the graduate to critically analyze and use scientific literature to improve clinical decision-making and practice. This course introduces the terminology and strategies of evidence-based practice applied to physical therapy. It emphasizes the basic concepts such as research design, measurement principles and basic statistics.

PT 822. Scientific Inquiry II. 2 Credits.
This course is a continuation of the graduate’s preparation to practice critical analysis skills related to scientific literature. Its emphasis is placed on knowing the components of research reports and concepts associated with judging the quality and value of research. Students will apply this knowledge to answer clinical questions of diagnosis, prognosis, and intervention.

PT 826. Theory and Practice III. 4 Credits.
A continuation of the important aspects of physical therapy practice. This semester is made up of the following units: spinal cord injury, pediatric neurologic dysfunction, and adult neurologic dysfunction. The course focuses on treatment procedures including proprioceptive neuromuscular facilitation, current motor control and motor learning concepts, and neurodevelopmental treatment.

PT 827. Theory and Practice IV. 4 Credits.
This course covers advanced and special interest areas of practice such as joint mobilization, sports medicine, special testing equipment, mechanical traction application, and discharge planning for orthopaedic patients.

PT 836. Clinical Sciences III. 3 Credits.
This course continues with the presentation of pathologies and clinical manifestations of selected patient populations. Units within this course include pediatric, adult neurology, and spinal cord injury.

PT 837. Clinical Sciences IV. 3 Credits.
The continuation of a series in clinical areas. Emphasis areas in this course are on radiology, pharmacology, chronic pain, functional capacity evaluation and electrophysiological testing.

PT 842. Patient Evaluation III. 3 Credits.
This course covers the important evaluative elements associated with the neurological system, including evaluation of adult and pediatric patients with congenital or acquired conditions.

PT 857. Clinical Problem Solving III. 2 Credits.
Student must be a second year PT student enrolled in PT curriculum. Use of case discussions, sample patients, and small group experiences to challenge student’s abilities to apply information from class to actual patient problems. For this course, the emphasis is on Neurological and pediatric patients.

PT 858. Clinical Problem Solving IV. 2 Credits.
Use of case discussions, sample patients, and small group experiences to challenge student’s abilities to apply information from class to actual patient problems. For this course, the emphasis is on orthopedic patients.

PT 865. Prosthetics and Orthotics. 3 Credits.
This course addresses the examination, assessment and fabrication issues associated with the development of prosthetics and orthotics for selected patient populations. Prerequisites: PT 665 and PT 666.

PT 871. Clinical Internship II. 4 Credits.
The student is provided an 8-week opportunity to apply academic philosophy, theory, and practices during a period of clinical education. This internship or PT 872 will consist of a rehabilitation experience (pediatric or adult neurology). The student will be required to collect data for a research case study during this internship or PT 872.

PT 872. Clinical Internship III. 4 Credits.
The student is provided an 8-week opportunity to apply academic philosophy, theory, and practices during a period of clinical education. This internship or PT 871 will consist of a rehabilitation experience (pediatric or adult neurology). The student will be required to collect data for a research case study during this internship or PT 871.

PT 873. Clinical Internship IV. 4 Credits.
Students spend eight weeks at different facilities in a full-time internship. This course provides an opportunity to develop on-site innovative clinical investigations with program and clinical faculty coordination/supervision.

PT 874. Clinical Internship V. 4 Credits.
A final clinical experience for physical therapy students. Students spend eight weeks at different facilities in a full-time internship. This course provides an opportunity to develop on-site innovative clinical investigations with program and clinical faculty coordination/supervision.

PT 880. Psychosocial Aspects of Patient Care. 2 Credits.
This course focuses upon the emotional and psychological elements associated with illness and disease. Students will learn the various societal and personal views of sickness and chronic illness as well as the coping mechanism employed by individuals and families when facing disease and terminal illness.

PT 881. Management of Special Populations. 2 Credits.
This course describes physical therapy management of challenges associated with selected groups of people. Effects of aging on gait and equilibrium will be discussed. Topics will include osteoporosis, breast and prostate cancer, sexuality, nutrition, the female athlete, the senior athlete, health care placement options, and social support in American society.

PT 882. Practice Management. 3 Credits.
This course is designed to provide the physical therapy student with a review of the principles and practices of managing and administering physical therapy in various clinical settings. The course stresses the principles of management administration in patient care in clinical environments.

PT 883. Professional Issues in Physical Therapy. 2 Credits.
This course is for the identification, analysis, and discussion of issues currently facing the physical therapy profession. The issues focus on the ethical questions as well as the role relationships of physical therapists in the greater health care delivery system of the United States.
PT 884. Clinical Teaching and Professional Communication. 3 Credits.
This course is designed to meet the needs for patient instruction, education
within the classroom and clinic, and peer continuing education. The focus of
the course is on clear communication in the teaching/learning process.

PT 890. Differential Diagnosis Seminar. 3 Credits.
The focus of this seminar is on the integration of the student’s knowledge in
the areas of the foundation and clinical sciences through the application of
problem solving in differential diagnosis.

PT 891. Seminar in Integrative Case Studies. 3 Credits.
This course provides the faculty and students the forum to present clinical
case studies. The students will have collected the data for their individual
case presentations during the previous summer internships.

PT 892. Scientific Inquiry Seminar. 2 Credits.
This is the final course in the Scientific Inquiry series. The purpose is to
apply the concepts of research methods and design in the framework of
evidence-based practice to specific clinical problems. Students will appraise
systematic reviews, guidelines, and the economics of health care in a
seminar format.

PT 893. Research Topics. 2 Credits.
Research topics.

PT 895. Topics in Physical Therapy I. 1 Credit.
This course will expose interprofessional students to current trends in health
promotion and illness prevention. Topics will include: Healthy People 2020
objectives, age specific clinical guidelines for health promotion and illness
prevention, theories on behavior and motivation, sociocultural issues, and
screening for a variety of health problems. Measures for promoting and
maintaining health throughout the lifespan will be explored with attention to
current research from the literature.

PT 896. Topics in Physical Therapy II. 1 Credit.
Students will pick from a variety of clinical specialty practice, service
learning or research topics to explore in a small group setting.

READ - Reading

READING Courses

READ 612. Action Research in Reading. 3 Credits.
This course will introduce students to action research, a form of self-
reflective, systematic inquiry by educators of their own practice. Students
will learn about research methods, design, and implementation, and they
will develop action research proposals based on a line of structured inquiry
emanating from events occurring within their own classrooms. Teachers
will study student learning related to their own teaching, a process which
allows them to learn about their own instructional practices and to continue
monitoring improved student learning. Conducting action research provides
educators with an avenue to reflect on their own teaching practices with the
aid of empirical data and engage in self-directed learning with the ultimate
goal of improving student learning. Must have completed 15 Graduate credit
hours in reading coursework.

READ 618. Approaches to Teaching Literature and Writing K-12. 3
Credits.
Lecture 3 hours, 3 credits. Explores the theory and practice of teaching
literature, including young adult and children’s literature, and writing.
Considers some of the characteristics of writing processes, the role of the
teacher in structuring and responding to student writing, the role of the
teacher in literary text selection, the relationships between writing and
literacy understanding, and the authentic assessment of K-12 students’
reading, writing and learning.

READ 619. Word Study, Phonics, and Linguistics. 3 Credits.
Provides an overview of the field of linguistics, the scientific study of
language and word study, an approach to spelling instruction that relies
on an understanding of English orthography that incorporates instruction
in phonics, spelling and vocabulary. Students will learn to recognize
characteristics of readers and writers at different levels of development. The
course provides multiple opportunities for hands-on practice and application.

READ 620. Multicultural Children’s Literature and Literacy. 3 Credits.
Lecture 3 hours; 3 credits. Provides for the examination, evaluation, and use
of multicultural library materials and resources for elementary and middle
school children.

READ 622. Culturally Responsive Literacy for All Learners. 3 Credits.
Explores curriculum, instructions, materials and issues related to teaching
literacy and language to diverse learners regardless of their ethnic, cultural,
linguistic, cognitive, religious, gender, backgrounds, etc.

READ 625. Issues and Trends in Literacy Education. 3 Credits.
This course provides an opportunity for students to explore the critical
trends and issues being debated within the field of Literacy Education. This
course will provide students with an in-depth understanding of significant
issues, trends, and practices in reading instruction at the K-12 level. The
course is designed to deal with questions and problems of the type facing
teachers, supervisors, and administrators. In addition to providing students
with a deeper understanding of current trends and the latest literacy research,
this course will also help students to critique ideas and issues surrounding
informed instruction within literacy education.

READ 628. New Literacies, Digital Technologies, and Learning. 3
Credits.
This course is designed to provide a context in which in-service teachers
can explore a range of “new” literacies and consider their relationships
to school-based literacy education. Participants will explore these new
literacies, specifically the socially immersive experiences of youth and their
new media practices. These participating educators will examine the role of
multimodality in literacy learning across the curriculum with an emphasis
on how to bridge the digital literacies of students’ private lives with the
traditional print practices valued in school. Teachers will gain insight into
and understanding of how young people’s participation in a shifting media
landscape can help shape and form learning and literacy in the 21st Century
classroom.

READ 637. Problems in Reading Education. 3 Credits.
Lecture, 3 hours. 3 credits. Prerequisite: FOUN 612 and 15 hours in
Reading Education. Presents an overview of current reading research and
its application to instruction. Provides study and practice in the use of
quantitative or qualitative techniques, including analytical processes, in
solving problems in reading education.

READ 680. Reading to Learn Across the Curriculum. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Graduate standing. This class has
an emphasis on advanced techniques in reading for classroom teachers
who are not reading specialists. Students develop an understanding of the
process of reading to learn across the curriculum including a wide variety
of comprehension strategies and an understanding of the complex nature of
reading throughout the disciplines. Lecture, demonstrations, development
of materials, and practice in the techniques of reading for elementary and
secondary classroom teachers and library media specialists are provided.

READ 683. Diagnostic Teaching of Reading in the Classroom. 3 Credits.
Lecture 3 hours, 3 credits. Provides classroom teachers with strategies/techniques to employ to ongoing diagnosis and remediation through the use of informal and standardized tests to select appropriate instructional strategies for pupils’ existing reading capabilities.

READ 685. Organizing and Supervising Reading Program Development. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: 9 graduate hours in reading. Presents
an overview of the total school reading program (K-12), and not only
prepares the prospective reading supervisor to make decisions pertaining to
the procurement of materials for the program but also explores modes for
integrating reading into the general curriculum.

READ 686. Advanced Language Development and Reading. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Graduate standing. Explores
current theories of cognitive development and their relationship to language
development and reading as bases for evaluating methods and materials of
teaching reading and the related communicative arts: spelling, writing, and
speaking.

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adults. Students also develop an understanding of the historical and program of career and technical education for high school students. This course is designed to teach career and technical education, and adults in business, government, and industrial organizations. It involves videotaped micro-teaching demonstrations.

SEPS 503. Methods in Career and Technical Education. 3 Credits.
Lecture 3 hours; 3 credits. A practical study and application of recommended methods of teaching career and technical education to high school students. Video-taped micro-teaching demonstrations are included. The course should be taken the semester prior to student teaching.

SEPS 508. Advanced Classroom Issues and Practices in Career and Technical Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: junior standing and passing scores on PRAXIS I or State Board of Education-approved SAT or ACT scores. An overview of classroom issues and practices for prospective career and technical teachers. The course covers classroom management and safety, communication processes, reading in the content area and child abuse and neglect recognition and intervention. Students learn the legal requirements and alternative teaching strategies for serving students with special needs. Students visit schools for a 30-hour student observation. PRAXIS II completion is a course requirement.

REL 509. Fashion Market Trip. 3 Credits.
Lecture 3 hours; 3 credits. This is the study of planning and conducting a fashion buying trip to one of the major fashion markets in the United States like the Las Vegas Magic Trade Show. The students envision themselves as buyers in action and learn how trend forecasting and creative presentations help market fashion products and services to trade customers and consumers.

REL 510. The Foreign Fashion Market Trip. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: SEPS 208. Students plan and conduct a fashion buying trip to a foreign market in Europe or Asia, and learn how to buy merchandise in the global marketplace. The course requires students to go on the trip as well as attend the pre- and post-trip classes.

REL 511. Fashion Show Production. 3 Credits.
Lecture 3 hours; 3 credits. Students plan and produce a fashion show. They examine each behind-the-scenes step from concept to execution as they organize and stage a show that is profitable, entertaining, and aesthetically pleasing.

REL 523. Visual Merchandising and Display. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of the instructor. This course is designed to introduce students to the best practices and effective strategies in visual merchandising. It will provide the basic framework with which prospective merchandisers plan and construct visual displays that enhance the selling of merchandise and ideas.

REL 524. Fashion, Textiles, and Construction Analysis. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of the instructor. This course explores information related to new technological advances in the textile/apparel industry and determines consumer preferences and concepts of fashion product quality. It includes the development of standards for judging qualities of merchandise. Fabrics are examined to determine the value they provide to the apparel and accessories customer.

REL 530. Technology Applications in Training. 3 Credits.
Lecture 3 hours; 3 credits. This course is designed to prepare training professionals to plan and conduct training using technological applications. The course covers instructional technology skills, computer systems, and software that trainers need so that they can teach basic computer and information skills in business, industry and government.

REL 531. Web-Based Organization for Fashion. 3 Credits.
Lecture 3 hours; 3 credits. This course provides the basic communications foundations needed to conceive, plan, develop, implement, and maintain a Web-based organization for fashion. Upon completion, students will understand what is required to plan, launch and maintain a successful online venture, limited only by the willingness of the student to explore these technological advances.
SEPS 535. Global Retailing. 3 Credits.
This course examines globalization and the development of an integrated
global economy. Primary emphasis is placed on the strategies for successful
global business expansion for retailers in international markets.

SEPS 540. Global Sourcing. 3 Credits.
This course examines the role of global sourcing in the strategic positioning of
retailers in the global economy. Emphasis is placed on economic, political,
logistical, and ethical factors affecting world trade and global sourcing
decisions.

SEPS 550. Assessment, Evaluation and Improvement. 3 Credits.
Lecture 3 hours; 3 credits. This course prepares training and educational
specialists to plan for and conduct assessments to use in planning
instructional programs, evaluate individual learning, monitor student
progress, measure program effectiveness and efficiency, and evaluate the
return on investments of training courses and programs.

SEPS 571. Communication Industries. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: junior standing and industrial
technology major for 471. A course designed to provide career and technical
education teachers, industrial technologists, counselors, and administrators
an opportunity to observe and enhance their knowledge of representative
communication industries from the local region. (qualifies as a CAP
experience).

SEPS 572. Construction Industries. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: junior standing and industrial
technology major for 472. A course designed to provide career and technical
education teachers, industrial technologists, counselors, and administrators
an opportunity to observe and enhance their knowledge of representative
construction industries from the local region. (qualifies as a CAP experience).

SEPS 584. Student Teaching Mentored. 6-12 Credits.
6-12 credits. Prerequisites: completion of the approved teacher education
program in the major area, departmental approval, and permission of the
director of teacher education services. Passing scores on PRAXIS I or State
Board of Education-approved SAT or ACT scores and passing scores on the
appropriate PRAXIS II content examination required. Classroom placement
in school systems for students to apply content and methodologies. The
student is mentored by a school mentor and university faculty. This course is
for newly hired teachers on provisional contracts.

SEPS 586. Middle School Student Teaching for Technical Education. 6
Credits.
6 credits. Prerequisites: STEM 305, 306, SEPS 408, SPED 313, TLED
408 and SEPS 450; or SEPS 508, 596, STEM 730, SEPS 788, TLED
608, 616, READ 680 for graduate students. Passing scores on PRAXIS
I or State Board of Education-approved SAT or ACT scores and passing
scores on the appropriate PRAXIS II content examination are required.
Classroom placement for student teaching in a middle school technology
laboratory. Students apply content and methodology under the supervision of
a cooperating teacher and university faculty member. Available for pass/fail
grading only. (qualifies as a CAP experience).

SEPS 595. Topics in Occupational Education. 1-3 Credits.
1-3 credits each semester. Prerequisite: permission of the instructor. The
department offers selected topics designed to permit small groups of
qualified students to work in subjects of mutual interest which, due to their
specialized nature, may not be offered regularly.

SEPS 596. Topics in Career and Technical Education. 1-3 Credits.
1-3 credits each semester. Prerequisite: permission of the instructor. The
department offers selected topics designed to permit small groups of
qualified students to work in subjects of mutual interest which, due to their
specialized nature, may not be offered regularly.

SEPS 597. Independent Study in Occupational Education. 1-6 Credits.
1-6 credits. Prerequisite: permission of the instructor.

SEPS 603. Planning Issues for Vocational Special Needs Programs. 3
Credits.
Lecture 3 hours; 3 credits. Overview of vocational special needs programs
and services including their purposes and practices; characteristics of special
populations, including the medical and educational aspects of disability.

SEPS 604. Implementation and Administration of Vocational Special
Needs Programs. 3 Credits.
Lecture 3 hours; 3 credits. This course includes career/life planning,
transitioning, occupational information, and delivery of cooperative
education programs, instructional methods, and curriculum modification and
resources available to support vocational special needs programs.

SEPS 606. Vocational Evaluation Processes. 3 Credits.
Lecture 3 hours; 3 credits. This course includes the basic concepts and skills
of planning for and delivering vocational evaluation and career assessment
services, the use of vocational interviewing, individualized service planning,
report development and communication, and use of modifications and
accommodations. Students practice specific assessment techniques and
skills and the processes used in vocational evaluation and career assessment,
including job and training analysis, work samples and systems, situational
and community-based assessment, behavioral observation, and learning and
functional skills assessment.

SEPS 635. Research Methods in Occupational and Technical Studies. 3
Credits.
3 credits. Types of research, selection of problems, location of educational
information, collection and classification of data, organization, presentation,
and interpretation of findings. The focus is on conducting research in the
student’s content specialty area.

SEPS 636. Problems in Occupational and Technical Studies. 3 Credits.
3 credits. Prerequisite: OTED 635. Taken the last semester of graduate
work. Practice in the use of statistical and analytical techniques in solving
problems in occupational and technical studies related to secondary,
community college, and training environments.

SEPS 695. Topics in Occupational Education. 1-3 Credits.
1-3 credits each semester. The SEPS department offers selected topics
designed to permit groups of qualified students to work on subjects of
mutual interest which, due to their specialized nature, may not be offered
regularly.

SEPS 696. Topics in Occupational Education. 1-3 Credits.
1-3 credits each semester. The SEPS department offers selected topics
designed to permit groups of qualified students to work on subjects of
mutual interest which, due to their specialized nature, may not be offered
regularly.

SEPS 697. Independent Study in Occupational Education. 1-3 Credits.
1-3 credits each semester. Prerequisite: permission of the instructor.
Individual study under the supervision of a graduate faculty member.

SEPS 698. Thesis in Occupational Education. 3-6 Credits.
3-6 credits. Prerequisite: permission of the advisor. Research and writing of
the master’s thesis and scheduled conferences with the candidate’s advisor.

SEPS 740. Readings in Occupational and Technical Studies. 3 Credits.
Lecture 3 hours; 3 credits. A guided review of the literature to determine the
history, development, and issues of occupational and technical education,
including specialization in technology education, career and technical
education specialties, and human resources training.

SEPS 750. Trends and Issues in Training: Modeling and Simulation. 3
Credits.
Lecture 3 hours; 3 credits. This course is designed to explore the issues
and trends in developing and implementing technology-based training with
emphasis on modeling and simulation.

SEPS 760. Trends and Issues in Occupational Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: junior standing. This course prepares
training and educational professionals to plan for and conduct assessments
to use in planning research findings and issues related to tech prep and other
articulated programs being established in secondary schools, community
colleges, and fouryear institutions.

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SEPS 761. Foundations of Adult Education and Training. 3 Credits.
Lecture 3 hours; 3 credits. This course is a study of adult education and training in many settings including the community college, business, industry, labor, government, the military, and social service agencies of many types. An attempt will be made to assess the important trends or directions such activities are taking, including the needs of non-traditional learners and education and labor.

SEPS 762. Administration and Management of Education and Training Programs. 3 Credits.
Lecture 3 hours; 3 credits. This course deals with organizational policy, human and financial resources, facilities, and the planning process as applied to occupational education and adult training programs.

SEPS 765. Trends and Issues of Economic and Workforce Development. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: student must be accepted into doctoral program or have permission of the instructor. An analysis of economic trends and issues that lead to workforce development decisions. Focus is on planning for educational and training programs to meet workforce needs dictated by local and regional economic issues. This course is designed for community college and school system personnel.

SEPS 780. Administration and Supervision of Occupational Education. 3 Credits.
Lecture 3 hours; 3 credits. Study of the principles and practices of administering and supervising occupational education programs.

SEPS 785. Curriculum Development in Occupational Education and Training. 3 Credits.
Lecture 3 hours; 3 credits. A course designed to prepare students to design and develop curriculum for occupational education and training courses and programs. Included is a focus on articulation between secondary.

SEPS 787. Career and Technical Education Curriculum. 3 Credits.
Lecture 3 hours; 3 credits. Learn the various curriculum options taught in secondary schools under the auspices of career and technical education. Work from an administrative standpoint to learn the mission and goals of the various subject areas and plan to direct such efforts.

SEPS 788. Instructional Strategies for Innovation in Training and Occupational Education. 3 Credits.
Lecture 3 hours; 3 credits. Learning and teaching styles are considered as a basis for developing instructional strategies to maximize occupational and technical education at all levels, including secondary, the community college, and senior institutions. Relevant learning theories and knowledge of self, learner, and the environment are blended to enhance the participants’ instructional strategies.

SEPS 789. Instructional Technology in Education and Training. 3 Credits.
Lecture 3 hours; 3 credits. A course that provides insights about trends, issues, and the applications of instructional technologies as they may be applied to education and training environments. Topics include selected technical processes and electronic media to solve practical problems in education and training.

SEPS 790. Practicum in Occupational Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of the graduate program director. Individually prescribed instruction under the supervision of a graduate faculty member. Study intended to professionally fulfill development of graduate candidates.

SEPS 795. Topics in Occupational Education. 1-3 Credits.
1-3 credits each semester. The SEPS department offers selected topics designed to permit groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly.

SEPS 797. Independent Study in Occupational Education. 1-6 Credits.
1-6 Credits. Prerequisite: Permission of the instructor. Individual study under the supervision of an OTED graduate faculty member.

SEPS 835. Research Design for Occupational and Technical Studies. 3 Credits.
Lecture 3 hours; 3 credits. Analyses of current research and needs in occupational and technical studies. Students analyze the literature and develop a research focus for future graduate studies.

SEPS 840. Readings in Occupational and Technical Studies. 3 Credits.
Lecture 3 hours; 3 credits. A guided review of the literature to determine the history, development, and issues of occupational and technical education, including specialization in technology education, career and technical education specialties, and human resources training.

SEPS 850. Trends and Issues in Training: Modeling and Simulation. 3 Credits.
Lecture 3 hours; 3 credits. This course is designed to explore the issues and trends in developing and implementing technology-based training with emphasis on modeling and simulation.

SEPS 860. Trends and Issues in Occupational Education. 3 Credits.
Lecture 3 hours; 3 credits. Trends in philosophy, workforce needs, curriculum and teaching procedures in occupational and technical education. Analysis of research findings and issues related to tech prep and other articulated programs being established in secondary schools, community colleges, and four-year institutions.

SEPS 861. Foundations of Adult Education and Training. 3 Credits.
Lecture 3 hours; 3 credits. This course deals with organizational policy, human and financial resources, facilities, and the planning process as applied to occupational education and adult training programs.

SEPS 865. Trends and Issues in Training and Workforce Development. 3 Credits.
Lecture 3 hours; 3 credits. This course deals with organizational policy, human and financial resources, facilities, and the planning process as applied to occupational education and adult training programs.

SEPS 866. Internship. 3 Credits.
Internship. 3 Credits. Prerequisite: permission of the instructor. Supervised assignment to an agency operating an occupational education or training program.

SEPS 880. Administration and Supervision of Occupational Education. 3 Credits.
Lecture 3 hours; 3 credits. Study of the principles and practices of administering and supervising occupational education programs.

SEPS 885. Curriculum Development in Occupational Education and Training. 3 Credits.
Lecture 3 hours; 3 credits. A course designed to prepare students to design and develop curriculum for occupational education and training courses and programs. Included is a focus on articulation between secondary.

SEPS 887. Career and Technical Education Curriculum. 3 Credits.
Lecture 3 hours; 3 credits. Learn the various curriculum options taught in secondary schools under the auspices of career and technical education. Work from an administrative standpoint to learn the mission and goals of the various subject areas and plan to direct such efforts.
SEPS 888. Instructional Strategies for Innovation in Training and Occupational Education. 3 Credits.
Lecture 3 hours; 3 credits. Learning and teaching styles are considered as a basis for developing instructional strategies to maximize occupational and technical education at all levels, including secondary, the community college, and senior institutions. Relevant learning theories and knowledge of self, learner, and the environment are blended to enhance the participants’ instructional strategies.

SEPS 889. Instructional Technology in Education and Training. 3 Credits.
Lecture 3 hours; 3 credits. A course that provides insights about trends, issues, and the applications of instructional technologies as they may be applied to education and training environments. Topics include selected technical processes and electronic media to solve practical problems in education and training.

SEPS 890. Practicum in Occupational Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of the program director. Individually prescribed instruction under the supervision of a graduate faculty member. Study intended to professionally fulfill development of graduate candidates.

SEPS 895. Topics in Occupational Education. 1-3 Credits.
1-3 credits each semester. The SEPS department offers selected topics designed to permit groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly.

SEPS 897. Independent Study in Occupational Education. 1-6 Credits.
1-6 Credits. Prerequisite: Permission of the instructor. Individual study under the supervision of an OTED graduate faculty member.

SEPS 899. Dissertation in Occupational Education. 1-12 Credits.
1-12 credits. Prerequisite: permission of dissertation committee chair. Work on pre-selected dissertation topics under the direction of dissertation committee chair.

SEPS 999. Occupational and Technical Education 999. 1 Credit.
1 credit. A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

SMGT - Sport Management

SPORT MANAGEMENT Courses

SMGT 556. Sport Psychology. 3 Credits.
Lecture 3 hours; 3 credits. Study of the psychological bases of coaching strategies and methodologies. Emphasis is placed on applying knowledge in field settings.

SOC - Sociology

SOCIology Courses

SOC 500. War and Gender. 3 Credits.
In this course students grapple with issues concerning war, gender roles, and gender inequality. The course addresses gender roles in war throughout history, globally and across cultures. However, the United States military and military involvement in the 20th and 21st century will remain the primary focus areas. Discussions include how social norms and ideals of masculinity and femininity shape, and in turn are shaped by, images and realities of war, including gendered aspects of nationalism and just war theories. The military involvement of men, women (and children) in war and in peacetime, as participants and observers, perpetrators and victims, supporters and opponents of war is also discussed.

SOC 502. Sociology of Child Welfare. 3 Credits.
A sociological analysis of the field of child welfare. Topics include social inequality as it applies to children as a group in the U.S. and globally; understanding violence against children within the global context of children’s rights; examining data on the degree to which policies, programs and research in the field fail to protect children and why; prevalence, causes and consequences of child sexual, physical and emotional abuse and neglect; evaluation of programs like ‘family preservation’ and placement in ‘substitute’ care, i.e. foster care, adoption, institutionalization; changes that would protect and advance the interests and rights of children at the parent-child, agency and societal level.

SOC 505. Social Change and Social Movements. 3 Credits.
Analysis of the nature and causes of social change, major social movements, and their impact upon contemporary society.

SOC 521. Deviant Behavior. 3 Credits.
A study of various definitions and forms of deviant behavior, theoretical explanations of causes of deviant behavior and the impact of deviant behavior on society and the individual.

SOC 523. Women, Health and Healing. 3 Credits.
An examination of women’s experiences with health and illness and women’s roles in the health-care system as patients and care providers from a feminist sociological perspective.

SOC 526. The Sociology of Minority Groups. 3 Credits.
The study of the process of and responses to the oppression of racial, religious, ethnic, and national minorities in a variety of countries within a historical and comparative perspective. Special emphasis given to American minorities and especially African Americans.

SOC 527. Violence Against Women. 3 Credits.
A critical analysis of violence against women as an institution of social control. Examines violence in the context of social and political inequality and feminist critique. Issues explored include pornography, prostitution, sexual harassment, incest, battering and rape.

SOC 540. Health, Illness, and Society. 3 Credits.
The study of social and social-psychological factors related to health, illness, and treatment with a focus on social epidemiology, the medical industry, and health, illness, and sick-role behavior.

SOC 541. Drugs and Society. 3 Credits.
Topics include changes in the legal status of drugs, cross-cultural and historical variations in the control and use of drugs, and social epidemiology of drug use in contemporary society.

SOC 595. Topics in Sociology. 3 Credits.
The advanced study of selected topics designed to permit qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule, and will be more fully described in information distributed to academic advisors.

SOC 596. Topics in Sociology. 3 Credits.
The advanced study of selected topics designed to permit students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule, and will be more fully described in information distributed to academic advisors.

SOC 597. Tutorial Work in Special Topics in Sociology. 1-3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

SOC 598. Tutorial Work in Special Topics in Sociology. 1-3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

SOC 610. Applied Social Research Methods. 3 Credits.
The application of social science methods to practical problems. The topics of research design, measurement, scaling, sampling, data collection, and research organization are taught with reference to issues of reliability, validity and ethical concerns.
SOC 620. Proseminar in Sociological Theory. 3 Credits.
An examination of classical and contemporary sociological theories about the relations between the individual and society; the ways theory shapes and informs the study of social issues; and the relationship among theory, research and practice.

SOC 627. Violence Against Women. 3 Credits.
This course examines the many ways in which violence against women functions as an agent of social control. Violence is viewed on a continuum in order to determine how a variety of acts contribute to the subordination of women. Specific types of violence are explored including: wife assault, rape, incest, sexual harassment and pornography.

SOC 630. Applied Social Statistics. 3 Credits.
This course is a graduate-level introduction to social statistics as they may be applied to various practical problems. Students will learn the appropriate use of various statistical procedures through discussion and application. Prerequisites: SOC 610.

SOC 640. Sociological Application of Computer and Data Analysis. 3 Credits.
This course is a graduate-level introduction to the use of the computer in problems of data management and analysis. Students will use existing software packages (e.g. SPSS, SAS) to build specified data files and carry out various statistical procedures. Prerequisites: SOC 610.

SOC 644. Current Feminist Research in Sociology. 3 Credits.
The course provides a feminist analysis of the way women and gender traditionally have been studied in mainstream sociology. A minimum of one-third of the course is devoted to feminist critique of conventional conceptual and methodological approaches to gender relations in the social sciences. Feminist epistemological challenges are used to evaluate current research on selected topics reflecting the specialization and research interests of the faculty who teach the course.

SOC 650. Research Seminar. 3 Credits.
This seminar integrates the skills needed to complete a master’s thesis. Exercises include formulating research questions, developing a research design, and writing a publishable paper. Students practice these skills assignments in class and by completing their thesis proposal. Prerequisites: SOC 610 or CRJS 610, SOC 620 or CRJS 620, SOC 630 or CRJS 630, and SOC 640 or CRJS 640.

SOC 660. Sociology Seminar. 3 Credits.
An examination of contemporary research and policy issues in the study of sociology. The course also provides an overview for specific concentrations in criminal justice and women’s studies when necessary. Prerequisites: SOC 610 and SOC 620 and SOC 630 and SOC 640 and 6 hours of SOC electives at the graduate level.

SOC 668. Internship. 3 Credits.
Students gain first-hand experience in professional settings which are deemed appropriate given their academic background and career objectives. Students will be required to complete a research project which corresponds to their specific internship placement. Prerequisites: Permission of the instructor.

SOC 695. Topics of Sociology. 3 Credits.
Topics vary each semester.

SOC 696. Topics of Sociology. 3 Credits.
Topics vary each semester.

SOC 697. Independent Study in Special Topics in Sociology. 3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: Approval of the department chair.

SOC 698. Independent Study in Special Topics in Sociology. 3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate. Prerequisites: Approval of the department chair.

SOC 699. Thesis. 3-9 Credits.
Credit hours to continue thesis work.

SOC 740. Demographic Techniques. 3 Credits.
Basic methods of demographic analysis. Topics include population estimation and projection and the measurement of fertility, mortality, and migration.

SOC 795. Topics in Sociology. 1-3 Credits.
Topics vary by semester. Prerequisites: Six hours of graduate credit.

SOC 797. Independent Study in Sociology. 1-3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Prerequisites: Approval of department chair and 6 hours of graduate credit.

SOC 840. Demographic Techniques. 3 Credits.
Basic methods of demographic analysis. Topics include population estimation and projection and the measurement of fertility, mortality, and migration.

SOC 895. Topics in Sociology. 1-3 Credits.
Topics vary by semester. Prerequisites: Six hours of graduate credit.

SOC 897. Independent Study in Sociology. 1-3 Credits.
Independent reading and study on a topic to be selected under the direction of an instructor. Prerequisites: Approval of department chair and 6 hours of graduate credit.

SOC 999. SOC 999. 1 Credit.
Thesis hours.

SPAN - Spanish

SPANISH Courses

SPAN 507. Advanced Grammar and Syntax. 3 Credits.
Lecture 3 hours; 3 credits. Designed to refine competence in grammar and style in the process of writing various types of essays.

SPAN 510. Spanish Applied Linguistics. 3 Credits.
Lecture 3 hours; 3 credits. Course is an introduction to Spanish linguistics and its application to the teaching and learning of Spanish. Topics include Spanish syntax, semantics phonetics, and pragmatics and their practical applications to language learning.

SPAN 515. Spanish Phonetics. 3 Credits.
Lecture 3 hours; 3 credits. A study of the sound system of Spanish from both theoretical and applied perspectives. Intensive practice in pronunciation and contrastive analysis of Spanish and English.

SPAN 547. Drama of the Spanish Golden Age. 3 Credits.
Lecture 3 hours; 3 credits. A study of selected works of the major playwrights of the Golden Age: Lope de Vega, Calderon de la Barca, Tirso de Molina, Ruiz de Alarcón.

SPAN 548. Contemporary Spanish Drama. 3 Credits.
Lecture 3 hours; 3 credits. A study of contemporary Spanish playwrights since Federico García Lorca.

SPAN 549. Contemporary Spanish-American Drama. 3 Credits.
Lecture 3 hours; 3 credits. A study of contemporary Spanish-American drama through the reading of representative authors.

SPAN 550. Contemporary Peninsular Narrative. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisites: SPAN 311, 312W and (SPAN 331 or 332 or 333 or 334). Study of contemporary peninsular narrative works (novel, essay and some short story) within the Spanish social, political and cultural context of the last 40 years (1970-2012).

SPAN 551. Contemporary Latin American Narrative. 3 Credits.
Lecture, 3 hours. 3 credits. Prerequisites: SPAN 311, 312W and (SPAN 331 or 332 or 333 or 334). Study of contemporary Latin American narrative works (novel, essay and some short sotry) within the Spanish social, political and cultural context since the 1920’s.

SPAN 552. Latin American Poetry. 3 Credits.
Basic comprehension about representative works of Spanish American poetry after Ruben Dario and their influences on contemporary culture.
SPAN 553. Border Culture and Literature. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisites: SPAN 311, 312W and one from SPAN 331, 332, 333, or 334. Study of variety of current texts from the U.S. and Mexico, this course will explore the multiplicity of images that surround and define the highly contested and increasingly important area of the border. Course will focus on questions dealing with subaltern identities such as women, indigenous groups, immigrants, and the poor.

SPAN 560. Hispanic Film. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: 9 hours of 300-level Spanish courses. A topical study of the major works of Spanish and Latin American film from Bunuel to the present. The course will explore many issues, including those related to gender, race, symbolism, and class struggle. (cross-listed with COMM 443/543).

SPAN 571. Hispanic Women Authors. 3 Credits.
Lecture 3 hours; 3 credits. A study of fictional and non-fictional works by Spanish, Spanish-American, and U.S. Latina writers from the 16th to the 20th century. The course analyzes gender identity and roles and the interaction of gender, race, and class in literary representations of courtship and marriage, spirituality, nationalism, colonialism, and multiculturalism. (cross-listed with FLET 571).

SPAN 573. Contemporary Latina Literature: From Borders to Crossroads. 3 Credits.
Lecture 3 hours; 3 credits. The course focuses on poetry, prose fiction and theater written by Chicana, Puerto Rican, Cuban-American, and Dominican-American women authors in the last twenty years. Attention will also be paid to the very influential theoretical work written by Chicanas.

SPAN 595. Topics in Spanish. 1-3 Credits.
1-3 credits each semester. The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule and will be more fully described by academic advisors.

SPAN 596. Topics in Spanish. 1-3 Credits.
1-3 credits each semester. The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule and will be more fully described by academic advisors.

SPAN 602. Intensive Spanish for Teachers: Language and Culture. 3 Credits.
Lecture 3 hours; 3 credits. This course is designed for Spanish teachers interested in keeping up with cultural developments in the Spanish-speaking world and in main-taining/improving linguisitic performance. Emphasis will be placed on authentic materials from newspapers, magazines, film and video, and the Internet.

SPAN 695. Topics in Spanish. 1-9 Credits.
Lecture 1-9 hours; 1-9 credits. Advanced study of selected topics which may not be offered regularly. These courses appear in the course schedule booklet and are more fully described in supplements distributed to graduate program directors.

SPAN 696. Topics in Spanish. 1-9 Credits.
Lecture 1-9 hours; 1-9 credits. Advanced study of selected topics which may not be offered regularly. These courses appear in the course schedule booklet and are more fully described in supplements distributed to graduate program directors.

SPAN 697. Tutorial Work in Special Topics in Spanish. 1-3 Credits.
1-3 credits. Prerequisites: approval of the department chair. The independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

SPAN 698. Tutorial Work in Special Topics in Spanish. 3 Credits.
1-3 credits. Prerequisites: approval of the department chair. The independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

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SPED 517. Collaboration and Transitions. 3 Credits.
This course addresses the complex issues surrounding families and children with disabilities and transitions across the lifespan, as well as effective collaboration with families and professionals to support inclusion and/or effective early intervention services, educational programs and transition services for students at-risk and students with disabilities. Emphasis is on successful professional collaboration and effective relationships in educational, transition, and family settings.

SPED 532. Characteristics of Students with Visual Impairments. 1 Credit.
Prerequisites: SPED 400/SPED 500. Provides an overview of the characteristics of and services to persons with visual impairments, including the impact of visual impairment on infants’ and children’s growth and development, child and adolescent emotional and social development, and family interaction patterns. Considers the educational, conceptual, psycho-social, and physical implications of a visual impairment.

SPED 533. Braille Code. 3 Credits.
This course provides instruction in the development, use, and application of the Braille literary code and its implications for educational/literacy programs for students with visual disabilities. Students will develop the skills to read and write contracted and uncontracted Braille, while acquiring instructional methodologies for teaching children who are blind to read and write. Sources of Braille materials for educational purposes are identified.

SPED 534. Medical and Educational Implications of Visual Impairments. 3 Credits.
Provides an introduction to anatomy and physiology of the visual system and the educational implications of visual pathology. Topics include anatomy of the human eye, normal visual development, pathology of the eye, examination procedures for the identification of visual pathology, and the effects of pathology on visual learning and development. Practicum of 45 hours required. Prerequisites: passing Praxis I scores or equivalent as prescribed by the Virginia Board of Education. Pre- or corequisite: SPED 400/SPED 500 and SPED 432/SPED 532.

SPED 535. Orientation and Mobility. 2 Credits.
Provides the foundation for understanding the components and essence of orientation and mobility. Establishes how the need for independent travel in the blind population created the field of O&M. Explores the philosophy and history of orientation and mobility including cane instruction, dog guides and methods of travel. Addresses techniques in developing orientation skills and basic mobility instruction, Motor and concept skill development are emphasized. Practicum of 45 hours required. Prerequisites: Passing Praxis I scores or equivalent as prescribed by the Virginia Board of Education. Pre- or corequisite: SPED 400/SPED 500 and SPED 432/SPED 532.

SPED 536. Curriculum and Assessment of Students with Visual Impairments. 3 Credits.
Provides students with knowledge and understanding of the educational assessment of students with visual impairments and additional disabilities including deaf-blindness. Students will practice assessing and planning educational programs for students with visual impairments. Addresses assessment of technology for students with visual impairments. Examines determination of learning needs and appropriate learning media, relationship of assessment, IEP development, and placement. Practicum of 45 hours required. Prerequisites: passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education. Pre- or corequisite: SPED 400/SPED 500 and SPED 432/SPED 532.

SPED 537. Assistive Technology for People with Sensory Impairments. 2 Credits.
This course is designed for professionals and/or students interested in serving the visually impaired/blind population or hearing impaired/deaf population. It is designed to heighten the awareness of participants to specific technology and resources available to enhance and improve the ability of individuals with visual and hearing impairments to succeed in school, daily living activities and employment. Knowledge and awareness components of this course will be delivered via distance education.

SPED 569. Communication/Language Development and Intervention Strategies. 3 Credits.
Prerequisites: SPED 400/SPED 500. This course examines symbolic and non-symbolic communication/language development and acquisition. Emphasis is on routine-based communication training, communication/language facilitation strategies, augmentative communication systems, and informal/functional communication/language assessment procedures for students in early childhood special education students and students with severe/profound/multiple disabilities.

SPED 583. Field Experience Seminar in Special Education. 1 Credit.
Prerequisites: SPED 313, SPED 400/SPED 500 and SPED 402/SPED 502. Explores issues, problems, concerns and processes related to teaching and entering the profession of teaching. Passing scores on the Virginia Communication and Literacy Assessment (VCLA), Praxis II: Elementary Education Content Test, and Virginia Reading Assessment (VRA)/Reading for Virginia Educators (RVE) will be required by the end of the course.

SPED 586. Teacher Candidate Internship for Special Endorsement. 9 Credits.
Seven weeks will be completed at the elementary level and seven weeks will be completed at the middle/secondary level. Qualifies as a CAP experience. Prerequisites: admission to ODU Teacher Education Program; completion of the approved teacher education program in the specific endorsement area; completion of SPED 583; departmental approval; passing scores on Praxis I (or equivalent as prescribed by the Virginia Board of Education); passing scores on the Virginia Communication and Literacy Assessment (VCLA), the Virginia Reading Assessment (VRA)/Reading for Virginia Educators (RVE), and the appropriate Praxis II content examination.

SPED 595. Topics in Special Education. 1-3 Credits.
This course offers selected topics designed to permit small groups of qualified students to work on subjects of mutual interest in the special education field. Prerequisites: SPED 400/SPED 500.

SPED 610. Characteristics of Students Accessing the General Curriculum. 3 Credits.
Prerequisites: SPED 400/SPED 500. The intent of this course is to provide pre-service and currently licensed teachers with (a) knowledge of the characteristics of students with disabilities who are accessing the general curriculum, K-12, including, but not limited to limited learning disabilities, emotional disabilities, and intellectual disabilities; (b) the ability to recognize etiologies, underlying factors, and contributing conditions that impact student learning, and (c) the cultural impact of disabling conditions.

SPED 611. Instructional Strategies for Students accessing the General Education Curriculum. 3 Credits.
This course emphasizes effective research-based instructional strategies for teaching students with mild/moderate disabilities in grades K-12 who are accessing the general education curriculum. Practicum of 45 hours in middle/secondary-level setting is required. Prerequisites: SPED 400/SPED 500, SPED 415/SPED 515, SPED 610 and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 615. Behavior Change in Classroom. 3 Credits.
This course will focus on the following elements of effective management: integration of instruction for positive learning environment; strategies to provide students the opportunity to be successful academically, emotionally, and socially; assessment of and modifying the learning environment; and group and individualized strategies to affect behavior change in order to increase student learning.
SPED 618. Characteristics and Advanced Procedures: Emotional and Behavioral Disorders. 3 Credits.
This course addresses characteristics and various approaches to the education and treatment of emotional/behavioral disorders. Emphasis is on group/individualized programming that addresses social, emotional, academic and behavioral needs. Behavior measurement and direct observation, problem behavior specification, intervention development and implementation, data collection and analysis, curricular adaptation, and teacher collaboration skills for successful regular classroom reintegration and transition are also discussed. Practicum of 45 hours required. Prerequisites: SPED 400/SPED 500, SPED 415/SPED 515, and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 621. Effective Interventions for Children and Youth with Challenging Behavior. 3 Credits.
Students with challenging behavior pose a tremendous challenge to school personnel. Along with the growing incidence of behavior problems, there has been a dramatic increase in the number of research-supported interventions. Emphasis is on assessment of the structural and functional properties of problem behavior to facilitate development of interventions that match the nature and severity of the problem behavior. The course focuses on gaining knowledge of the likely source(s) of challenging behavior, including various strategies to document the environmental determinants of the behavior, establishment of school-wide, classroom-level, and student-specific intervention programs and ways to document the outcome of those interventions. Attention is given to adult- as well as peer-mediated intervention options for problem behavior reduction/replacement among children and youth from diverse backgrounds and across categories of exceptionality. Practicum of 45 hours required. Prerequisites: SPED 400/SPED 500, SPED 411/SPED 511, and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 623. Characteristics and Advanced Procedures: Intellectual Disabilities. 3 Credits.
The course examines the characteristics and various approaches to the education and treatment of students with intellectual disabilities and developmental disabilities. Assessment, curriculum development, instructional design, appropriate placement setting, transition and utilization of environmental resources are emphasized. Practicum of 45 hours required. Prerequisites: SPED 400/SPED 500, SPED 415/SPED 515, and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 625. Characteristics of Students with Autism Spectrum Disorders. 3 Credits.
Prerequisites: SPED 400/SPED 500. This course includes a review of characteristics of students on the autism spectrum, including those with autism, Asperger disorder, & PDD-NOS.

SPED 626. Characteristics and Advanced Procedures: Learning Disabilities. 3 Credits.
This course provides the professional educator with a variety of educational procedures for students with learning disabilities, including diagnostic assessment, causal nature, and research based instructional strategies for teaching students with learning disabilities. This course has an applied emphasis and includes a 45-hour practical experience with students with learning disabilities. Practicum of 45 hours required. Prerequisites: SPED 400/SPED 500, SPED 415/SPED 515, and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 627. Instructional Strategies for Students with Autism Spectrum Disorders. 3 Credits.
This course includes a review of intervention strategies for students on the autism spectrum, including those with autism, Asperger disorder, and PDD-NOD. Practicum of 45 hours required. Prerequisites: SPED 400/SPED 500, SPED 415/SPED 515, and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 628. Teaching Students with Severe Disabilities. 3 Credits.
This course addresses the characteristics and needs of individuals with severe disabilities. Emphasis is on assessment, program development, and instruction to address the needs of individuals with severe disabilities. Practicum of 45 hours required. Prerequisites: SPED 400/SPED 500, SPED 411/SPED 511, and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 630. Teaching Preschoolers with Disabilities. 3 Credits.
This course is designed to prepare students in curricula, materials and methods of instruction for preschool-aged (2 to 6 years) children with special needs. Programming for self-help, social, language, motor, and cognitive development are addressed. Data collection, program organization, and classroom planning are also covered. Practicum of 45 hours required. Prerequisites: SPED 400/SPED 500 and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 631. Developmental and Ecological Assessment Strategies. 3 Credits.
This course provides students with the skills necessary for assessment of atypical early development as well as best practices in assessing functional skills in students with severe disabilities. Students will explore and give assessments to children from birth to 6 years of age and students with severe/profound disabilities. Practicum of 45 hours required. Prerequisites: SPED 400/SPED 500 and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 633. Sensorimotor Development and Intervention Strategies. 3 Credits.
This course reviews typical and atypical development during infancy and intervention approaches for individuals, regardless of age, who function at developmental levels between birth and two years. Emphasis is on techniques for working with students who have physical disabilities. Practicum of 45 hours required. Prerequisites: SPED 400/SPED 500 and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 634. Capstone Seminar. 3 Credits.
Capstone seminar.

SPED 637. Infant/Family Intervention and Teamwork. 3 Credits.
This course prepares professionals from cross-discipline backgrounds to serve families with children who are at-risk and disabled from birth through age three. Emphasis is on the development of the individualized family service plan (IFSP), procedures, materials and curriculum for this population. A family-centered approach is stressed. Practicum of 45 hours required. Prerequisites: SPED 400/SPED 500, SPED 630, and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 638. Teaching Methods for Students with Visual Impairments. 3 Credits.
Emphasizes methods of teaching compensatory skills, the core curriculum, and technology for use by students who are blind and visually impaired. Addresses curriculum development, adaptations, and teaching methodology for individuals with visual impairments. Provides information on adaptations within various educational programs and adaptation of general education classroom materials and procedures for use with blind and low vision children and youth. Practicum of 45 hours required. Prerequisites: passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education. Pre- or corequisite: SPED 400/SPED 500 and SPED 432/SPED 532.

SPED 639. Braille Reading and Writing. 3 Credits.
This course provide basic instruction on transcription of advanced Braille codes, including: music, foreign language, chemistry, computer Braille, and Nemeth Code (Braille math code). Introduces techniques for teaching skills in each code. Explores technology tools used to create Braille and tactile materials in addition to other assistive technologies used for instruction in math and science. Practicum of 45 hours required. Prerequisites: SPED 433/SPED 533 and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education. Pre- or corequisite: SPED 400/SPED 500 and SPED 432/SPED 532.
SPED 640. Applied Behavior Analysis: Principles, Procedures, and Philosophy. 3 Credits.
This course focuses on basic principles and procedures of applied behavior analysis; identification of factors that contribute to behavioral problems and improved performance; and procedures that can be used to minimize behavioral problems, improve performance, teach new behaviors, and increase probability of behaviors occurring under appropriate circumstances. Prerequisites: Permission of the instructor.

SPED 641. Applied Behavior Analysis: Empirical Bases, 3 Credits.
This course focuses on basic content of applied behavior analysis. This course teaches how to implement behavioral procedures and develop behavioral programs for clients with fundamental behavioral needs. Pre- or corequisite: SPED 640 or permission of the instructor.

SPED 642. Ethics and Professional Conduct for Behavior Analysts, 3 Credits.
This course provides a basis in Virginia Behavior Analyst Licensure law, the Behavior Analyst Certification Board’s Guidelines for Responsible Conduct and Disciplinary Standards, and professional conduct consistent with the practice of applied behavior analysis. Prerequisites: SPED 640 or permission of the instructor.

SPED 643. Applied Behavior Analysis: Assessments and Interventions, 3 Credits.
This course further expands on basic content of applied behavior analysis and teaches how to implement behavioral procedures and develop behavioral programs for clients with fundamental behavioral needs. Prerequisites: SPED 640 or permission of the instructor.

SPED 644. Applied Behavior Analysis: Applications, 3 Credits.
This course expands capability to deal with more complex behavioral situations, enabling ability to relate to more sophisticated professional issues and environments. Prerequisites: SPED 640, SPED 641, and SPED 643 or consent of the instructor. Pre- or corequisite: SPED 643.

SPED 645. Applied Behavior Analysis: Verbal Behavior, 3 Credits.
This course further expands capability to deal with more complex behavioral situations, and enables students to relate to more sophisticated professional issues and environments. Prerequisites: SPED 643 or permission of the instructor.

SPED 669. Directed Field Projects-CDSE, 1-6 Credits.
The course provides supervised involvement in a practicum setting where the student and the instructor work together closely to develop curricula and gain expertise in teaching specific topics of importance to special educators. 50 hours per credit. Prerequisites: appropriate graduate instructional strategies course work and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 700. Social/Emotional Aspects of Child Development, 3 Credits.
The emphasis of this course is on the theoretical approaches to the social/emotional development of the child that include the psychodynamic, humanistic, cognitive, behavioral, and social learning models as applied to responsive practices that promote the healthy emotional wellbeing of children.

SPED 701. Historical and Contemporary Research in Special Education, 3 Credits.
This course covers contemporary and historical topics related to problem issues in special education. This is a course of study that will enable participants to examine various research topics in special education and take and defend a position on an issue.

SPED 702. Cognitive Processes and Learning Strategies for Students with Special Needs, 3 Credits.
The intent of this course is to provide an overview of research and critical issues relative to the cognitive and affective development of individuals with disabilities. Research-based interventions that address deficits of cognitive processes will be discussed and specific learning strategies will be presented.

SPED 705. Advanced Student and Program Evaluation in Special Education, 3 Credits.
The intent of this course is to provide scholars with the advanced knowledge of systems and theories of assessment, special education evaluation and eligibility determination, and the skill competence to design and implement research activities, instruction, and student and program evaluation. Scholars will access, evaluate, and use valid formative and summative assessment and evaluation measures for monitoring and promoting student learning and educational performance. Prerequisites: FOUN 611 and SPED 701.

SPED 707. Advanced Instructional Procedures in Special Education, 3 Credits.
This course provides students with advanced skills in educational planning, development, and implementation for students with learning problems. Techniques focus on inclusive and self-contained classroom arrangements.

SPED 714. Alternative Strategies for Secondary Students, 3 Credits.
This course is designed to provide students with an opportunity to examine and develop curriculum strategies and adaptations which may be used to meet the needs of students with diverse learning needs. Practicum of 45 hours required. Prerequisites: SPED 400/SPED 500, SPED 415/SPED 515, and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 715. Alternative Strategies for Elementary Students: Prevention and Intervention, 3 Credits.
The intent of this course is to provide pre-service and in-service teachers with the knowledge and skill to collaborate with other professionals to identify and remediate students who are at-risk for school problems due to academic challenges and/or behavior, and to effectively support students with identified mild disabilities in general education classrooms. The course focuses on developing proactive pre-referral interventions and working with general educators to develop and implement effective interventions, accommodations, modifications and supports for students with mild difficulties in general education classes. Prerequisites: SPED 400/SPED 500, SPED 415/SPED 515, and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 720. Curriculum and Instruction: Research Into Practice, 3 Credits.
This course provides an overview of research methods employed in the field of special education. Current trends related to curriculum and instruction in general and special education will be investigated. Strategies and procedures for identifying learner characteristics and application of that knowledge will be included. Implementation of quality curricular modifications and/or instructional accommodations for students with diverse needs in a variety of educational settings and evaluation of instruction will be addressed. Prerequisites: SPED 400/SPED 500 or SPED 701/SPED 801.

SPED 800. Social/Emotional Aspects of Child Development, 3 Credits.
The emphasis of this course is on the theoretical approaches to the social/emotional development of the child that include the psychodynamic, humanistic, cognitive, behavioral, and social learning models as applied to responsive practices that promote the healthy emotional wellbeing of children.

SPED 801. Historical and Contemporary Research in Special Education, 3 Credits.
This course covers contemporary and historical topics related to problem issues in special education. This is a course of study that will enable participants to examine various research topics in special education and take and defend a position on an issue.

SPED 802. Cognitive Processes and Learning Strategies for Students with Special Needs, 3 Credits.
The intent of this course is to provide an overview of research and critical issues relative to the cognitive and affective development of individuals with disabilities. Research-based interventions that address deficits of cognitive processes will be discussed and specific learning strategies will be presented.
SPED 807. Advanced Instructional Procedures in Special Education. 3 Credits.
This course provides students with advanced skills in educational planning, development, and implementation for students with learning problems. Techniques focus on inclusive and self-contained classroom arrangements.

SPED 814. Alternative Strategies for Secondary Students. 3 Credits.
This course is designed to provide students with an opportunity to examine and develop curriculum strategies and adaptations which may be used to meet the needs of students with diverse learning needs. Practicum of 45 hours required. Prerequisites: SPED 400/SPED 500, SPED 415/SPED 515, and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 815. Alternative Strategies for Elementary Students: Prevention and Intervention. 3 Credits.
The intent of this course is to provide pre-service and in-service teachers with the knowledge and skill to collaborate with other professionals to identify and remediate students who are at-risk for school problems due to academic challenges and/or behavior, and to effectively support students with identified mild disabilities in general education classrooms. The course focuses on developing proactive pre-referral interventions and working with general education teachers to develop and implement effective interventions, accommodations, modifications and supports for students with mild difficulties in general education classes. Prerequisites: SPED 400/SPED 500, SPED 415/SPED 515, and passing scores on Praxis I or equivalent as prescribed by the Virginia Board of Education.

SPED 820. Curriculum and Instruction: Research Into Practice. 3 Credits.
This course provides an overview of research methods employed in the field of special education. Current trends related to curriculum and instruction in general and special education will be investigated. Strategies and procedures for identifying learner characteristics and application of that knowledge will be included. Implementation of quality curricular modifications and/or instructional accommodations for students with diverse needs in a variety of educational settings and evaluation of instruction will be addressed. Prerequisites: SPED 400/SPED 500 or SPED 701/SPED 801.

SPED 821. Critical Issues I: Readings in Special Education and Professional Writing. 3 Credits.
The intent of this course is to provide doctoral candidates an opportunity to do the following: (a) become thoroughly involved in the literature relating to current critical issues in special education, and (b) begin the process of developing writing skills suitable for positions and tenure in higher education. The course stresses APA writing guidelines and style, conducting literature searches, and beginning development of a writing product that is suitable for publication. The course provides an introduction to the skills necessary for advancement in higher education and professional institutions.

SPED 822. Critical Issues II: Research and Professional Writing. 3 Credits.
Prerequisites: SPED 821. This course provides doctoral candidates an opportunity to read, analyze and synthesize research in special education with the intent of contributing to the literature. The course emphasizes skills necessary for developing writing skills suitable for positions and tenure in higher education. APA writing guidelines and style, analyzing and synthesizing research/ literature, and producing a lengthy written product suitable for publication are stressed. The course is designed to build skills necessary for advancement in higher education and professional institutions.

SPED 868. Internship: Urban Child Study/Special Education. 3 Credits.
Internships in teaching, research, and other professional activities will provide experience in the roles that students will assume after completing their doctoral degrees. The successful completion of a 3-credit internship is required to fulfill program requirements and necessitates a commitment of a minimum of 150 contact hours. Internships may be at the regional, national or international levels.

SPED 869. Practicum/Field Experience. 6-12 Credits.
Supervised involvement of the doctoral-level student in a practicum setting, where the student and the instructor work together closely to develop curriculum and gain expertise in teaching specific topics of importance to early childhood educators. A weekly seminar is required.

SPED 893. Professional Seminar: Teaching, Research, and Service. 3 Credits.
Prerequisites: SPED 821 and SPED 822. This course prepares doctoral candidates to meet professional standards in teaching, research and service in special education in higher education institutions. Teaching includes an understanding of adult learning and the design, delivery, evaluation of content, and use of technology in college teaching. Research includes recognizing and critically discussing scholarly work, systematically planning and preparing for research, and developing research proposals. Service includes identifying professional organizations and agencies and creating integrated professional development programs. The course is designed to build skills necessary for advancement in higher education and professional institutions.

SPED 899. Dissertation. 1-12 Credits.
Dissertation. Prerequisites: Completion of candidacy examination.

SPED 999. Early Childhood and Special Education 999. 1 Credit.
A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term.

SRM - Sport and Recreation Management

SPORT AND RECREATION MANAGEMENT Courses

SRM 711. Theory and Application in Sport and Recreation. 3 Credits.
The course examines the concepts, theories and philosophies of sport and recreation. Discussion will focus on historic and current issues in sport and recreation. Information will be presented and discussed concerning the application of theories, and the role and function of sport and recreation from the global to the local level. The class content will cover the major areas of the professions.

SRM 738. Fiscal Planning and Management in Sport and Recreation. 3 Credits.
This course is designed to examine the principles and practices of financial management in diverse sport and recreation service settings. This course will explore the basic concepts of financial planning and analysis required to effectively manage a successful operation. The concepts covered in this course include finance, economics, accounting, and general business practices. The course is intended to offer a broad perspective of sport finance along with the basic skills associated with fiscal planning and management. Students will gain an understanding of the core principles associated with the financial management of sport and recreation enterprises.

SRM 746. Sport and Recreation Marketing. 3 Credits.
This course will familiarize the student with theoretical and practical aspects of sports and recreation marketing including the dynamic nature of sport and recreation marketing and the importance of branding. Through lecture and case-study analysis, the course will provide students with an understanding of the importance of marketing and consumer behavior theory and fundamentals specific to the marketing of sport and recreation. The course is also designed to introduce students to marketing within the sport and recreation industry, including understanding the unique aspects of sport and recreation as product, the sport and recreation consumer market and the sport product market.
SRM 750. Ethics in Sport and Recreation Management. 3 Credits.
This course is designed to provide students with an understanding of ethics and morals and how each applies in sport and recreation management settings. This course will include the study of theoretical models of moral development. In addition, teleological and deontological theories of ethics will be examined with special application made to the sports and recreation environments. Models of ethical analysis, codes of ethics, and the development of a personal and administrative philosophy will also be emphasized.

SRM 752. Facility Management for Sport and Recreation. 3 Credits.
This course examines the principles of facility operation for sport, recreation, and entertainment events. It will provide students with an understanding of the unique challenges and opportunities commonly faced by facility managers. Students will analyze current research related to planning, funding, and operating sport/recreation facilities.

SRM 753. Sponsorship and Event Planning. 3 Credits.
This course focuses on two separate yet related topics: sponsorship and event planning. Many events in today’s marketplace forge partnerships with sponsors to provide benefits that are favorable to both parties. This course is designed to provide students with a detailed examination of the relationship between sport or leisure events and corporate sponsorship. In addition, this course will cover many aspects associated with planning an event such as working with stakeholders, budgeting, selecting a site, marketing and presenting the event.

SRM 755. Social Issues in Sport and Recreation. 3 Credits.
The course will examine the nature and scope of sport and leisure from sociological, historical, economic, and philosophical perspectives. Special emphasis will be placed on studying selected issues and topics that impact sport and recreation managers and their understanding of the role that sport, recreation, and leisure play in society. Sport, recreation and leisure related topics include commercialism, deviance, drugs, gender, mass media, Olympic Movement, politics, race, religion, social class, social mobility, gambling, special populations, violence, youth sports, and the future of sport, recreation, and leisure.

SRM 760. Legal Aspects of Sport and Recreation. 3 Credits.
Course will introduce students to various aspects of the legal system as it relates to the management and supervision of sport and recreation facilities, programs, participants, spectators and events.

SRM 764. Field Experience in Sport and Recreation Management. 6 Credits.
Designed to provide detailed practical experience (400 clock hours) in a sport or recreation management field setting.

SRM 775. Management and Leadership in Sport and Recreation. 3 Credits.
This course will examine various management and leadership principles as they apply to sport and recreation settings. Special emphasis will be placed on studying leadership theories, management objectives, planning, decision making, problem-solving, and staffing in sport and recreation.

SRM 780. Youth Development in Sport and Recreation. 3 Credits.
The Positive Youth Development (PYD) movement has been greatly influenced by sport and recreation. With the recent increase of diabetes, obesity, sedentary lifestyles, and risky behaviors among youth, sport and recreation professionals are charged to help alleviate these societal issues. More specifically, practitioners need to target the socio-emotional needs of our youth through the sport and recreation experience. By using class lectures, technology, video, and self-directed research, students will explore research, theory, practice, and techniques of structuring positive experiences for youth. This course includes the examination of theories on youth development, behavior management, motivation, resiliency, and social skills as they relate to the sport and recreation experience.

SRM 797. Independent Study in Sport and Recreation Management. 1-3 Credits.
Independent study in sport and recreation management. Problems approved in advance are investigated under the supervision of a faculty member. Prerequisites: Approval of instructor required.

SRM 811. Theory and Application in Sport and Recreation. 3 Credits.
The course examines the concepts, theories and philosophies of sport and recreation. Discussion will focus on historic and current issues in sport and recreation. Information will be presented and discussed concerning the application of theories, and the role and function of sport and recreation from the global to the local level. The class content will cover the major areas of the professions.

SRM 838. Fiscal Planning and Management in Sport and Recreation. 3 Credits.
This course is designed to examine the principles and practices of financial management in diverse sport and recreation service settings. This course will explore the basic concepts of financial planning and analysis required to effectively manage a successful operation. The concepts covered in this course include finance, economics, accounting, and general business practices. The course is intended to offer a broad perspective of sport finance along with the basic skills associated with fiscal planning and management. Students will gain an understanding of the core principles associated with the financial management of sport and recreation enterprises.

SRM 846. Sport and Recreation Marketing. 3 Credits.
This course will familiarize the student with theoretical and practical aspects of sports and recreation marketing including the dynamic nature of sport and recreation marketing and the importance of branding. Through lecture and case-study analysis, the course will provide students with an understanding of the importance of marketing and consumer behavior theory and fundamentals specific to the marketing of sport and recreation. The course is also designed to introduce students to marketing within the sport and recreation industry, including understanding the unique aspects of sport and recreation as product, the sport and recreation consumer market and the sport product market.

SRM 850. Ethics in Sport and Recreation Management. 3 Credits.
This course is designed to provide students with an understanding of ethics and morals and how each applies in sport and recreation management settings. This course will include the study of theoretical models of moral development. In addition, teleological and deontological theories of ethics will be examined with special application made to the sports and recreation environments. Models of ethical analysis, codes of ethics, and the development of a personal and administrative philosophy will also be emphasized.

SRM 853. Sponsorship and Event Planning. 3 Credits.
This course focuses on two separate yet related topics: sponsorship and event planning. Many events in today’s marketplace forge partnerships with sponsors to provide benefits that are favorable to both parties. This course is designed to provide students with a detailed examination of the relationship between sport or leisure events and corporate sponsorship. In addition, this course will cover many aspects associated with planning an event such as working with stakeholders, budgeting, selecting a site, marketing and presenting the event.

SRM 855. Social Issues in Sport and Recreation. 3 Credits.
The course will examine the nature and scope of sport and leisure from sociological, historical, economic, and philosophical perspectives. Special emphasis will be placed on studying selected issues and topics that impact sport and recreation managers and their understanding of the role that sport, recreation, and leisure play in society. Sport, recreation and leisure related topics include commercialism, deviance, drugs, gender, mass media, Olympic Movement, politics, race, religion, social class, social mobility, gambling, special populations, violence, youth sports, and the future of sport, recreation, and leisure.

SRM 860. Legal Aspects of Sport and Recreation. 3 Credits.
Course will introduce students to various aspects of the legal system as it relates to the management and supervision of sport and recreation facilities, programs, participants, spectators and events.
SRM 864. Sport and Recreation Marketing. 3 Credits.
This course will familiarize the student with theoretical and practical aspects of sports and recreation marketing including the dynamic nature of sport and recreation marketing and the importance of branding. Through lecture and case-study analysis, the course will provide students with an understanding of the importance of marketing and consumer behavior theory and fundamentals specific to the marketing of sport and recreation. The course is also designed to introduce students to marketing within the sport and recreation industry, including understanding the unique aspects of sport and recreation as product, the sport and recreation consumer market and the sport product market.

SRM 875. Management and Leadership in Sport and Recreation. 3 Credits.
This course will examine various management and leadership principles as they apply to sport and recreation settings. Special emphasis will be placed on studying leadership theories, management objectives, planning, decision making, problem-solving, and staffing in sport and recreation.

SRM 880. Youth Development in Sport and Recreation. 3 Credits.
The Positive Youth Development (PYD) movement has been greatly influenced by sport and recreation. With the recent increase of diabetes, obesity, sedentary lifestyles, and risky behaviors among youth, sport and recreation professionals are charged to help alleviate these societal issues. More specifically, practitioners need to target the socio-emotional needs of our youth through the sport and recreation experience. By using class lectures, technology, video, and self-directed research, students will explore research, theory, practice, and techniques of structuring positive experiences for youth. This course includes the examination of theories on youth development, behavior management, motivation, resiliency, and social skills as they relate to the sport and recreation experience.

SRM 897. Independent Study in Sport and Recreation Management. 1-3 Credits.
Independent study in sport and recreation management. Problems approved in advance are investigated under the supervision of a faculty member.

SRM 999. Sport and Recreation Management 999. 1 Credit.
A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

STAT - Statistics
STATISTICS Courses

STAT 505. Introduction to Data Handling. 3 Credits.
Use of SAS and R to handle data sets. Topics for SAS include data input, creating permanent data sets, merging data sets, creating new variables, sorting, printing, charting, formatting, IML programming, macro programming, and an overview of proc SQL and other statistical procedures. Topics for R include data structure, control structure, writing functions, and graphics.

STAT 531. Theory of Statistics. 3 Credits.
Topics include point and interval estimation, tests of hypotheses, introduction to linear models, likelihood techniques, and regression and correlation analysis. Prerequisites: A grade of C or better in STAT 331 or permission of the instructor.

STAT 532. Sampling Theory. 3 Credits.
Sampling from finite populations is discussed. Topics such as simple random sampling, stratified random sampling and ratio and regression estimation are included. Also discussed are aspects of systematic sampling, cluster sampling, and multi-stage sampling. Prerequisites: A grade of C or better in STAT 431/STAT 531.

STAT 535. Design and Analysis of Experiments. 3 Credits.
Topics include analysis of variance with one or more factors, multiple comparisons, randomized blocks, Latin squares and related designs; multifactor factorial experiments; blocking and confounding in the (2) factorial design; two-level fractional factorial designs. Statistical software will be used to analyze real life data. Prerequisites: A grade of C or better in STAT 405 or STAT 505 and STAT 437 or STAT 537.

STAT 537. Applied Regression Analysis. 3 Credits.
Topics include theory of least squares, simple linear regression, multiple regression (including its matrix formulation), applications of these techniques to real life data, residual analysis, selection of variables, multicollinearity issues, regression on dummy variables, and analysis of covariance. Prerequisites: A grade of C or better in STAT 531. Pre- or corequisite: STAT 405 or STAT 505.

STAT 540. Clinical Trials. 3 Credits.
An introduction to statistical methods used in the design, conduct, and analysis of clinical trials. Topics include: study designs, treatment allocation, sample size and power, clinical life tables, log rank test, cross-over designs, and sequential methods of monitoring clinical trials. Prerequisites: A grade of C or better in STAT 431 or STAT 531.

STAT 542. Environmental Statistics. 3 Credits.
Topics include nonlinear and generalized linear models, quantitative risk assessment, analysis of stimulus-response and spatially correlated data, methods of combining data from several independent studies. Regression settings are emphasized where one or more predictor variables are used to make inferences on an outcome variable of interest. Applications include modeling growth inhibition of organisms exposed to environmental toxins, spatial associations of like species, risk estimation, and spatial prediction. SAS is used extensively in the course.

STAT 547. Analysis of Longitudinal Data. 3 Credits.
Prerequisites: A grade of C or better in STAT 431 or STAT 531. Topics include general linear models, weighted least squares (WLS), maximum likelihood (ML), restricted maximum likelihood (REML) methods of estimation, analysis of continuous response repeated measures data, parametric models for covariance structure, generalized estimating equations (GEE) and quasi least squares (QLS), models for discrete longitudinal data: marginal, random effects, and transition models. Limitations of existing approaches will be discussed. Emphasis will be on the application of these tools to data related to the biological and health sciences. Methods will be implemented using statistical software.

STAT 549. Nonparametric Statistics. 3 Credits.
Topics include the theory and applications of binomial tests and rank tests, including the tests of McNemar, Mann-Whitney, Friedman, Kruskal-Wallis, and Smirnov. Prerequisites: A grade of C or better in STAT 330 or STAT 331 or departmental, permission.

STAT 550. Categorical Data Analysis. 3 Credits.
Topics include relative risk and odds ratio measures for 2 x 2 tables, the chi-square and Mantel-Haenszel tests, Fisher’s exact test, analysis of sets of 2 x 2 tables using Cochran-Mantel-Haenszel methodology, analysis of I x J and sets of I x J tables for both nominal and ordinal data, logistic regression including the logit and probit models, and building and applying loglinear models. Emphasis will be on the application of these statistical tools to data related to the health and social sciences. Interpretation of computer output will be stressed. Prerequisites: A grade of C or better in STAT 431 or STAT 531.
STAT 60. Statistical Simulation/Programming Using Statistical Software Packages. 3 Credits.
This course is a data-based tour of advanced statistical techniques using software packages, exploring a catalog of data sets (simulated or otherwise) spanning a variety of fields and applications, including data suitable for regression, ANOVA, time series modeling, longitudinal data analysis and multivariate techniques. Approaches will include parametric, nonparametric, simulation, and bootstrapping. SAS and R (5-plus) will be used extensively, with some other specialized products. For writing actual (not packaged) code, PROC IML and R will be used. This is a finishing course for applied statisticians, highly recommended for students planning a career in statistical programming and simulation. Prerequisites: A grade of C or better in STAT 505 and two of STAT 535, STAT 537, STAT 547 and STAT 550.

STAT 597. Topics in Statistics. 1-3 Credits.
The advanced study of selected topics. Prerequisites: permission of the instructor.

STAT 613. Applied Statistical Methods I. 3 Credits.
Intended for graduate students in all academic disciplines; not available for credit to graduate students in the Department of Mathematics and Statistics. Topics include descriptive statistics, probability computations, estimation, hypothesis testing, linear regression, analysis of variance and categorical data analysis. Emphasis will be on statistical analysis of data arising in a research setting. The rationale for selecting methods to address research questions will be emphasized. Examples will be given from the health sciences, social sciences, engineering, education and other application areas.

STAT 625. Mathematical Statistics I. 3 Credits.
625 is prerequisite to 626. Lecture 3 hours; 3 credits each semester.
Prerequisite: STAT 531. An introduction to probability and statistical inference. Topics include probability, conditional probability, Bayes formula, random variables, stochastic independence, expectation, moment generating functions, transformations. Limit theorems and convergence concepts, point and interval estimation, hypothesis testing, correlation and regression analyses, nonparametric statistics, sufficiency, Neyman-Pearson Lemma, and the Cramer-Rao inequality.

STAT 626. Mathematical Statistics II. 3 Credits.
625 is prerequisite to 626. Lecture 3 hours; 3 credits each semester.
Prerequisite: STAT 531. An introduction to probability and statistical inference. Topics include probability, conditional probability, Bayes formula, random variables, stochastic independence, expectation, moment generating functions, transformations. Limit theorems and convergence concepts, point and interval estimation, hypothesis testing, correlation and regression analyses, nonparametric statistics, sufficiency, Neyman-Pearson Lemma, and the Cramer-Rao inequality.

STAT 627. Linear Statistical Models. 3 Credits.
Topics include the multivariate normal distribution, distributions of quadratic forms, the general linear model, estimability, the Gauss-Markov theorem and general linear hypotheses, analysis of variance (ANOVA) and covariance (ANCOVA) with special attention to unbalanced data, and analysis of mixed effects and variance components models including repeated measures and split-plot designs. Prerequisites: STAT 626.

STAT 628. Applied Multivariate Analysis. 3 Credits.
Topics include the multivariate normal distribution, graphical display of multivariate data and tests for normality, Hotelling’s T2, multivariate analysis of variance (MANOVA) and regression, profile analysis, growth curve models, canonical correlation analysis, principal components, factor models, clustering, and discriminant analysis. All methods are implemented using the SAS statistical software. Prerequisites: STAT 537 or STAT 627 or permission of the instructor.

STAT 630. Time Series Models. 3 Credits.
This course examines the principles and concepts of time series and forecasting. Study includes theory, methods, and model parameter estimation taking into account correlation and autocorrelation structures with data applications from pollution, economics, seasonal trends, and the stock market. Notions of autoregressive, moving, average, stationary and nonstationary ARIMA models will be discussed. The multivariate version and state-space models will also be introduced. Simulation of time series data will be discussed in depth. Prerequisites: STAT 626, STAT 505, and STAT 537.

STAT 632. Master’s Project. 3 Credits.
Under the guidance of a faculty member in the Department of Mathematics and Statistics, the student will undertake a significant data analysis problem in a scientific setting outside the department. A written report and/or public presentation of results will be required. Prerequisites: permission of graduate program director.

STAT 635. Statistical Consulting. 3 Credits.
This course is intended to teach statistical consulting techniques to graduate students in statistics. Students are expected to work on statistical consulting problems brought by faculty and graduate students in various fields. Prerequisites: STAT 626.

STAT 640. Survival Analysis. 3 Credits.
Survival time models, clinical life tables, nonparametric methods for estimating survival functions, Cox regression, survival distributions, mathematical and graphical methods for goodness of fit, proportional hazards models, comparison of treatment groups, regression models. Prerequisite: STAT 626.

STAT 667. Cooperative Education. 1-3 Credits.
1-3 credits. Student participation for credit based on academic relevance of the work experience, criteria, and evaluative procedures as formally determined by the department and the cooperative education program prior to the semester in which the work experience is to take place.

STAT 697. Topics in Statistics. 1-3 Credits.
Advanced study of selected topics. Prerequisites: permission of the instructor.

STAT 727. Statistical Inference I. 3 Credits.
Topics include group and exponential families, sufficiency, unbiasedness, equivariance, properties of estimators, large sample theory, maximum likelihood estimation, EM algorithm, asymptotic optimality, information inequality, decision theory, minimax, admissibility, Bayes estimates, generalized Neyman-Pearson Lemma, uniformly most powerful tests, unbiased tests, invariant tests, and Bayesian tests. Prerequisites: A grade of C or better in MATH 517 and STAT 626.

STAT 728. Statistical Inference II. 3 Credits.
Topics include group and exponential families, sufficiency, unbiasedness, equivariance, properties of estimators, large sample theory, maximum likelihood estimation, EM algorithm, asymptotic optimality, information inequality, decision theory, minimax, admissibility, Bayes estimates, generalized Neyman-Pearson Lemma, uniformly most powerful tests, unbiased tests, invariant tests, and Bayesian tests. Prerequisites: A grade of C or better in MATH 517 and STAT 626.

STAT 795. Seminar in Statistics. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

STAT 797. Topics in Statistics. 1-3 Credits.
Advanced study of selected topics. Prerequisites: Permission of the instructor.

STAT 827. Statistical Inference I. 3 Credits.
Topics include group and exponential families, sufficiency, unbiasedness, equivariance, properties of estimators, large sample theory, maximum likelihood estimation, EM algorithm, asymptotic optimality, information inequality, decision theory, minimax, admissibility, Bayes estimates, generalized Neyman-Pearson Lemma, uniformly most powerful tests, unbiased tests, invariant tests, and Bayesian tests. Prerequisites: A grade of C or better in MATH 517 and STAT 626.
MAJOR and overall GPA of at least 2.75. (Additional prerequisites for MCTP in the specific content area and professional education core, minimum major and overall GPA of at least 2.75. (Additional prerequisites for MCTP students are ECI 608 and 616.).)

STAT 828. Statistical Inference II. 3 Credits.
Topics include group and exponential families, sufficiency, unbiasedness, equivariance, properties of estimators, large sample theory, maximum likelihood estimation, EM algorithm, asymptotic optimality, information inequality, decision theory, minimax, admissibility. Prerequisites: A grade of C or better in MATH 517 and STAT 626.

STAT 895. Seminar in Statistics. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

STAT 897. Topics in Statistics. 1-3 Credits.

STAT 898. Research. 1-9 Credits.

STAT 899. Dissertation. 1-9 Credits.

STAT 999. Statistics 999. 1 Credit.
1 cr. Pass/Fail grading.

STEM - Science, Tech, Engr, Math Edu

SCIENCE, TECH, ENGR, MATH EDUC Courses

STEM 533. Developing Instructional Strategies PreK-6: Mathematics. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: 530. Following a theory into practice philosophy, students explore, develop, and use instructional strategies, materials, technologies, and activities to promote children’s development of attitudes, behaviors, and concepts in mathematics in grades PreK-6 in support of NCTM national instructional standards and the Virginia Standards of Learning.

STEM 534. Developing Instructional Strategies PreK-6: Science. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: 530. Following a theory into practice philosophy, students explore, develop, and use instructional strategies, materials, technologies, and activities to promote children’s development of attitudes, behaviors, and concepts in science in grades PreK-6 in support of AAAS national instructional standards and the Virginia Standards of Learning.

STEM 535. Developing Instructional Strategies for Teaching in the Middle/High School: Mathematics. 3 Credits.
Following a theory/research-into-practice philosophy, students explore, develop, and use instructional strategies, materials, technologies, and activities to promote the development of attitudes, behaviors, and concepts in mathematics, grades 6-12, in support of national instructional standards and the Virginia Standards of Learning; 35 hours of teaching practicum required. Prerequisites: TLED 530, or TLED 677, passing scores on PRAXIS I or equivalent SAT scores as established by VA Board of Education, a criminal background check, acceptance into teacher education, grade requirement in the specific content area and professional education core, minimum major and overall GPA of at least 2.75. (Additional prerequisites for MCTP students are ECI 608 and 616.).

STEM 536. Developing Instructional Strategies for Teaching in the Middle/High School: Science. 3 Credits.
Following a theory/research-into-practice philosophy, students explore, develop, and use instructional strategies, materials, technologies, and activities to promote the development of attitudes, behaviors, and concepts in science, grades 6-12, informed by national instructional standards and the Virginia Standards of Learning; 35 hours of teaching practicum required. Prerequisites: TLED 530, or TLED 677, passing scores on PRAXIS I or equivalent SAT scores as established by VA Board of Education, a criminal background check, acceptance into teacher education, grade requirement in the specific content area and professional education core, minimum major and overall GPA of at least 2.75. (Additional prerequisites for MCTP students are ECI 608 and 616.).

STEM 571. Communication Industries. 3 Credits.
Lecture 3 hours; 3 credits. A course designed to provide career and technical education teachers, industrial technologists, counselors, and administrators an opportunity to observe and enhance their knowledge of representative communication industries from the local region. (qualifies as a CAP experience).

STEM 572. Construction Industries. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: A course designed to provide career and technical education teachers, industrial technologists, counselors, and administrators an opportunity to observe and enhance their knowledge of representative construction industries from the local region. (qualifies as a CAP experience).

STEM 573. Manufacturing Industries. 3 Credits.
Lecture 3 hours; 3 credits. A course designed to provide career and technical education teachers, industrial technologists, counselors, and administrators an opportunity to observe and enhance their knowledge of representative manufacturing industries from the local region. (qualifies as a CAP experience).

STEM 574. Service Industries. 3 Credits.
Lecture 3 hours; 3 credits. A course designed to provide career and technical education teachers, industrial technologists, counselors, and administrators an opportunity to observe and enhance their knowledge of representative service industries from the local region. (qualifies as a CAP experience).

STEM 575. Transportation Industries. 3 Credits.
Lecture 3 hours; 3 credits. A course designed to provide career and technical education teachers, industrial technologists, counselors, and administrators an opportunity to observe and enhance their knowledge of representative transportation industries from the local region. (qualifies as a CAP experience).

STEM 586. Middle School Student Teaching for Technology Education. 6 Credits.
6 credits. Prerequisites: SEPS 508, 596, 588, STEM 730, TLED 608, 616, READ 680 for graduate students. Passing scores on PRAXIS II or State Board of Education-approved SAT or ACT scores and passing scores on the appropriate PRAXIS II content examination are required. Classroom placement for student teaching in a middle school technology laboratory. Students apply content and methodology under the supervision of a cooperating teacher and university faculty member. Available for pass/fail grading only. (qualifies as a CAP experience).

STEM 595. Topics. 1-3 Credits.

STEM 651. Differentiation of Mathematics Instruction for Diverse Student Populations. 3 Credits.
Lecture 3 hours; 3 credits. Adapting the mathematics teaching and learning practices to accommodate diverse populations will be explored. The essential knowledge and understanding needed by mathematics specialists to assist classroom teachers in effectively utilizing differentiated instruction will be highlighted.

STEM 653. Mathematics in the Elementary/Middle School. 3 Credits.
Lecture 3 hours; 3 credits. Presents an overview of the content and structure of the various mathematics curricula. Methods of teaching mathematics in the elementary and middle school are introduced with special emphasis on technology in the mathematics classroom.

STEM 654. Science in the Elementary/Middle School. 3 Credits.
Lecture 3 hours; 3 credits. Current developments and educational research are applied to instructional methodology with an emphasis on hands-on activities in the school science curriculum.

STEM 655. Culturally Responsive Classroom. 3 Credits.
Lecture 3 hours. 3 credits. This course will focus on the following elements of effective teaching practice: understanding discipline specific content and methods, employing best-practice strategies to teach discipline specific skills and concepts, assessing student learning, legal and safety issues, use of technology, issues of diversity, engagement with the community, and strategies for continuing to grow as a teacher and learner.
STEM 658. Math Methods for Middle and Secondary School. 3 Credits. Lecture 3 hours; 3 credits. For MCTP students only. Course will explore the basic building blocks necessary to develop effective teaching skills in the mathematics classroom. These skills, including a thorough knowledge of the appropriate level of content, relevancy, pedagogy-based research on how learning takes place, opportunities to use writing and reading techniques, manipulative tools, technology, and other resources vital to creating a learning community in the classroom, will be emphasized in academic discussion, observation and application. Exploration of effective, research-based mathematical teaching methodology and evaluation standards. Emphasis placed on strategies including cooperative learning, technology, manipulatives, cultural influences and cross content teaching strategies.

STEM 659. Science Methods for Middle and Secondary School. 3 Credits. Lecture 3 hours; 3 credits. For MCTP students only. This course is designed to give prospective science teachers practical applications of current science instructional theories. The student will engage in the investigative nature of science through the exploration of philosophies, the use of research, laboratory experimentation, interactive technology, instructional methods, and assessment/evaluation techniques.

STEM 660. Action Research for Mathematics Specialists. 3 Credits. Lecture 3 hours; 3 credits. Departmental approval required. Action Research is introduced as a means to conduct classroom-based studies in the context of mathematics. The practical nature of research methods that mathematics specialists can use in conjunction with their mathematics instructional program is emphasized.

STEM 661. Mathematics Specialists as Teacher Leaders. 3 Credits. Lecture 3 hours, 3 credits. The critical characteristics and responsibilities of Mathematics Specialists as teacher leaders will be explored. Structuring classroom assistance through peer coaching, mentoring, observations and conferencing will be highlighted to expand the prospective Mathematics Specialists’ leadership capacity.

STEM 662. Mathematical Assessment for Data Driven Decisions. 3 Credits. Lecture 3 hours, 3 credits. Selected key differences between assessment for and of learning will be examined as a means to provide rich descriptions of student learning. Designing and using quality assessment systems to inform instructional decisions and guide student learning will serve as a framework for Mathematics Specialists.

STEM 668. Internship for Mathematics Specialist. 3 Credits. Prerequisites: MATH 303 and MATH 335. An internship experience that provides mathematics specialists an opportunity to develop the necessary knowledge, skills and dispositions to impact and improve the mathematics program of schools. Requires 150 hours of internship.

STEM 720. STEM Educational Foundations. 3 Credits. Lecture, 3 hours; 3 credits. A multidisciplinary course designed to provide insights about the fundamental concepts and basis for STEM education programs. Standards for the school subjects of science, technology, engineering education and mathematics literacy will be reviewed. Connections between these subjects will be explored.

STEM 732. Program Development for Technology Education. 3 Credits. 3 credits. Plan and develop effective program in technology related activities. Focus is on identification and development of resources, activities, and materials for classroom programs.

STEM 795. Topics. 3 Credits.

STEM 820. STEM Educational Foundations. 3 Credits. Lecture, 3 hours; 3 credits. A multidisciplinary course designed to provide insights about the fundamental concepts and basis for STEM education programs. Standards for the school subjects of science, technology, engineering education and mathematics literacy will be reviewed. Connections between these subjects will be explored.

STEM 821. Science, Technology, Engineering, and Mathematics Connection and Integration. 3 Credits. Lecture, 3 hrs. 3 credits. Prerequisite: STEM 720 or 820. A course designed to teach how to plan integrated STEM curriculum and instructional materials. A review of projects that have undertaken STEM integration will be made. Students will learn how to map STEM content and then design STEM integrated curriculum and instructional materials.

STEM 830. Introduction to Technology. 3 Credits. 3 credits. Order and structure the discipline of technology by identifying and analyzing the component parts and examining technical means as critical variables in the affairs of humankind. Based on the Standards for Technological Literacy.

STEM 831. Technical Systems. 3 Credits. 3 credits. Analyze the technical concepts common and unique to the technical systems of technology.

STEM 832. Program Development for Technology Education. 3 Credits. 3 credits. Plan and develop effective program in technology related activities. Focus is on identification and development of resources, activities, and materials for classroom programs.

STEM 895. Topics. 3 Credits.

TAX - Taxation

TAXATION Courses

TAX 650. Tax Strategies for Business Decisions. 3 Credits. Lecture 3 hours; 3 credits. An intensive course in taxation. Focuses on the choice of business entity by covering taxation of corporations (both C and S corporations), partnerships and sole proprietorships. The course emphasizes research skills and professional ethics.

TAX 651. Taxation of Corporations I. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: ACCT 521 or equivalent. Covers federal income taxation of corporations and shareholders. Includes organizing a corporation; establishing capital structure; determining tax liability; dividends and other non-liquidating distributions; stock redemptions; and liquidations.

TAX 652. Taxation of Partners and Partnerships. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: ACCT 521 or equivalent. Taxation of partners and partnerships: formation, termination, distributions and liquidations, and sales of partnership interests. Limited partnerships in conjunction with their use as tax shelters, and the multifaceted attributes of family partnerships.

TAX 653. Taxation of Estates and Gifts. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: ACCT 521 or equivalent. Examines transfers under federal estate and gift tax laws. Includes property owned by the decedent; retained life estates; transfers taking effect at death; transfers with retained powers; concurrent property interest; powers of appointment; valuation problems; expenses, debts, and taxes; charitable bequests; marital deduction; taxable inter vivos gifts; gift splitting and credits; consideration of Chapter 14 and asset freezing techniques; and transfer taxation of life insurance.
TAX 654. Income Taxation of Estates, Trusts & Beneficiaries. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: TAX 653. Examines simple, complex, and revocable trusts; trusts accumulation distributions; income in respect of decedents; trust accounting income; distributable net income; terminations; excess deductions; basis rules; and the decedent’s final income tax return.

TAX 655. Taxation of Corporations II. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: TAX 651. Analyzes the different types of taxable and tax-free acquisitions and reorganizations. Includes determining tax consequences for corporations and shareholders involved in an acquisition or reorganization and analyzing necessary requirements for a tax-free corporate division (spin-off). Covers aspects of filing consolidated federal income tax returns.

TAX 656. Taxation of Deferred Compensation. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: TAX 651. Discusses federal income taxation of deferred compensation plans with emphasis on qualified retirement plans. Reviews plan qualification requirements, reporting and disclosure requirements, and distribution rules. Includes discussion of specific types of plans such as Sec. 401(K) and ESOPs.

TAX 657. State and Local Taxation. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: ACCT 521 or equivalent. Examines state levying of individual income, corporate income, property, sales, and excise taxes.

TAX 658. Tax Aspects of International Business. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: ACCT 521 or equivalent. Taxation of foreign persons conducting business in the U.S. including FIRPTA, source of income rules, and residency requirements; taxation of U.S. individuals and businesses doing business abroad including FSCs, CFCs, FHP Co’s and possessions corporations.

TAX 660. Taxation of Property Transactions. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: ACCT 521 or equivalent. Covers determination of realized and recognized gains and losses and their tax treatment on property dispositions. Includes consequences of property transactions, such as depreciation, depletion, basis and capital gains problems.

TAX 661. Taxation of the Small Business Corporation. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: ACCT 521 or equivalent. Covers federal income taxation of S corporations including election eligibility; termination of status; treatment of income and deduction items; distributions; and basis of stock and debt. Also discusses compensation arrangements in closely held corporations; fiscal year issues; personal service corporations; the advantages of C corporations versus S corporations; corporation liquidation and redemption rules; and the S corporations’ built-in gains tax.

TAX 662. Tax Procedure and Practice. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: ACCT 521 or equivalent. Discusses procedures for dealing with the IRS. Includes sources of IRS policy; processing returns; auditing returns; rulings and determination letters; assessments and collections; and interest and civil penalties.

TAX 695. Selected Topics in Taxation. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: ACCT 521 or equivalent. Examines the unique rules applicable to federal taxation of farmers and ranchers. Also, covers the basics on the new Limited Liability Company and Virginia law on LLCs. Topics may vary each year.

TAX 697. Independent Study. 3 Credits. 3 credits. Prerequisites: ACCT 521 or equivalent and approval of instructor. Individually supervised research projects in selected tax areas. Approval of supervising professor as to topic and evaluation of project required at time of registration.

THEA - Theatre

THEATRE Courses

THEA 541. American Theatre. 3 Credits. A study of dramatic theories and theatre practices as they relate to the development and growth of theatrical art in the United States.

THEA 542. Principles of Directing. 3 Credits. An examination and practical application of principles of stage direction as influenced by play script, acting talent, set and lighting design, and the technical facilities of production organizations.

THEA 543. Acting Three. 3 Credits. An advanced scene study class exploring issues of style and period pertinent to portraying characters on stage. Prerequisite: THEA 152, THEA 252 or permission of instructor.

THEA 545. Experimental Theatre. 3 Credits. An in-depth study of avant-garde theatre scripts and performance techniques from 1900 to the present. Prerequisite: THEA 230 or permission of instructor.

THEA 547. Women in Theatre. 3 Credits. A study of the contributions women have made to the theatre as actresses, directors/managers, designers, and playwrights, and of their creative problems and methodologies.

THEA 549. Script and Performance Analysis. 3 Credits. Approaches script and performance analysis by examining the separate elements of action, character, language, music, spectacle or “mise en scene” in order to discover play spine and style as a basis for staging the play. Also examines the method of “scoring a role” or finding character motivations in relation to overall play spine.

THEA 552. Acting Four. 3 Credits. An advanced scene study class exploring issues of style and period pertinent to portraying characters on stage.

THEA 571. International Film History. 3 Credits. An examination of world cinema as a technology, a business, an institution, and an art form from its inception to the present. Emphasis is on the narrative fiction film, its technological and aesthetic development, economic organization, and socio-cultural context. Representative classic and contemporary works will be screened and analyzed.

THEA 579. American Film History. 3 Credits. An examination of American motion pictures as an art form, a business and an institution from its inception to the present. Primary attention is accorded to the narrative fiction film, its aesthetic and technological development, economic organization and social impact. This course highlights the many connections between film history and American culture.

THEA 580. The Video Documentary II. 3 Credits. A production/studio course designed to complement the work developed in Theatre 380: The Video Documentary I. Discussion/presentation topics range from production field work to post-production editing. The final third of the semester will be devoted to compiling the rough footage in post production.

THEA 586. Advanced Filmmaking, 3 Credits. Offers the advanced film/video maker an opportunity to produce a project beyond the scope of previous classroom projects.

THEA 595. Topics in Theatre. 1-3 Credits. The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule and will be more fully described by academic advisors.
TLCI 722. Curriculum Seminar in Content Areas. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Investigates the role and nature of the curriculum for particular subject-matter specialties — e.g., math, social studies, science, English, school librarianship, reading, etc. Objectives are tailored to specific content areas.

TLCI 724. Readings in Contemporary Society. 3 Credits.
Lecture 3 hours; 3 credits. prerequisite: graduate standing. A survey of the literature related to the issues and trends in contemporary society and provides educators with a substantive base in the philosophy, history, theory, strategies, and multicultural perspectives relevant to curriculum development.

TLCI 726. Advanced Supervision of Reading Programs. 3 Credits.
Lecture 3 hours; 3 credits. Explores various models of supervision and relates them to the administration and supervision of reading programs. Also prepares the prospective administrator/supervisor to make decisions relative to the methods and materials used to teach reading.

TLCI 727. Advanced Practicum in Reading. 3 Credits.
3 credits. This course is designed for teachers having completed the initial reading practicum. Its focus is on the refinement and further exploration of ways to work with students experiencing reading difficulties. Both group and individual tutoring experiences will be provided. Ways will be explored to encourage involvement in existing educational programs and schools.

TLCI 728. Contemporary Issues in Literacy Research. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: M.S.Ed. in Reading Education. Directed study of current topics of interest to students involved in literacy research. Topics to include emergent literacy assessment, adult literacy programs, and other areas of investigation. Students will be required to prepare a scholarly paper reporting results for publication.

TLCI 731. Instructional Technology Trends in Curriculum and Instruction. 3 Credits.
Lecture 3 hours; 3 credits. Examines selected issues and trends involving the use of technology in curriculum and instruction. Students develop a critical awareness of contemporary technology, an understanding of current research regarding the successful implementation of technology in curriculum and instruction, and strategies for using new technology in the future.

TLCI 732. Visual Communication and Design for Instructional Environments. 3 Credits.
Lecture 3 hours; 3 credits. Course focuses on visual literacy and the language of graphics. Students will learn to design visual messages, including text, graphics, and data displays. The theoretical underpinnings of various communications media and their efficacy in instructional environments will be studied and applied through graphics, textual, and multimedia software and components.

TLCI 735. Connecting Research In Early Developmental Practice in Early Childhood Education. 3 Credits.
Lecture. 3 credits. This seminar will explore philosophical orientations toward early childhood education, current research in the field, and the implications of this research for policy and practice. Students will focus on research within a community of practice orientation by linking current research and policy to current practices and issues in the field.

TLCI 736. Working with At-Risk Children and Families: An Ecological Approach. 3 Credits.
Lecture 3 hours; 3 credits. The influence of the home, the community and classroom on the achievement of at-risk children is examined. Successful teaching strategies and behavioral interventions also are discussed as well as the need to search for viable alternatives to strategies of past school reforms.

TLCI 737. Schools and Families: Enriching the Partnership. 3 Credits.
Lecture 3 hours; 3 credits. A critical examination and analysis of current trends in education as they affect the family and school will be addressed. Emphasis will be placed on the need for parent involvement and support in the child’s education.
TLCI 739. Cross Cultural Perspectives in Early Childhood Education. 3 Credits.
Lecture 3 hours; 3 credits. This course will address the socialization process as a component of the broad perspective of a child’s life. Curriculum development and how it is affected by the cultural context of an educational system will be discussed, as well as the impact of current trends on research and pedagogy in early childhood education.

TLCI 740. Issues in Early Childhood Language and Literacy. 3 Credits.
Lecture, 3 hours; 3 credits. This course follows a theory into practice philosophy, examining language acquisition and early literacy, teaching practice and learning. Students examine, develop and use advanced instructional strategies, materials, technologies, and activities to promote language and literacy development. The impact of formative assessment on instruction and curricular decision-making as well as cultural, social, familial, and multilingual issues will be addressed.

TLCI 741. Change Issues in Curriculum and Instruction. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Explores questions and issues related to the evolving nature of curriculum and instruction and the design of the contemporary curriculum. Through readings and projects, students will examine new discoveries in research and technology, the effect of these and other changes on education, and the challenges of life-long learning as an influence on change.

TLCI 752. Curriculum Problems in Urban Schools and Society. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Studies major curriculum problems and issues in urban education today and discusses how the changing urban environment affects curriculum planning and decision making.

TLCI 772. Advanced Developmental Process. 3 Credits.
Lecture 3 hours; 3 credits. This course is designed to examine the theoretical basis for alternative views of the nature of human development. Students’ understanding of topical areas in child development will be enhanced through an examination of current research in child development and relevant findings from cross-cultural study.

TLCI 774. Constructivist Teaching. 3 Credits.
Lecture 3 hours; 3 credits. This course addresses Piaget’s theory of cognitive and moral developments. Students will learn techniques for studying the behavior and development of young children. Analysis of constructivist research, replicated empirical work, and implications for planning learning environments and education programs for young children will be emphasized.

TLCI 788. Seminar in the Multicultural Environment. 3 Credits.
Lecture 3 hours; 3 credits. Explores topics related to the cultural characteristics of ethnically diverse populations and how these diverse populations and characteristics interact with social, political and economic institutions and the dominant culture to create the contemporary environment.

TLCI 795. Topics in Education. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits. Provides opportunities for doctoral students to explore topics related to curriculum, instructional strategies, and evaluation.

TLCI 797. Independent Study. 1-3 Credits.
Hours to be arranged; 1-3 credits. Provides opportunities for the doctoral student to do independent research in an area of his/her particular interests and needs.

TLCI 802. Historical and Contemporary Perspectives on Education. 3 Credits.
Lecture, 3 hours; 3 credits. The present educational system, its social impact and future implications are viewed in historical, philosophical, and sociological perspectives. Special attention is given to technology, research, multicultural education/equity and leadership.

TLCI 803. Perspectives and Inquiry in Curriculum and Instruction. 3 Credits.
Lecture 3 hours; 3 credits. This course introduces a range of methodologies, theoretical perspectives, and epistemologies in the field of curriculum and instruction. Students will gain strategies for critical reading, scholarly writing, and identify areas for prospective inquiry.

TLCI 804. Instruction Theories and Models. 3 Credits.
Lecture 3 hours; 3 credits. Students will investigate a range of instructional theories and design theories in terms of learning domains and pedagogical approaches to the teaching/learning process in a variety of educational settings. Students will utilize a systematic design process grounded in theories and research to propose/develop instruction for specific learning goals related to their own professional situations.

TLCI 805. Critical Issues: Curriculum Research. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Explores the relationship between the historical, philosophical, and sociopolitical influence on curriculum development and evaluation. Historical and cultural approaches to designing and implementing curricular models, curriculum reform, and understanding the politics of conceptualizing the curriculum process are highlighted. Major issues concerning educational curriculum reform are addressed and reviewed.

TLCI 810. Models of Parent, Child, Social Interaction. 3 Credits.
Lecture, 3 hours. 3 credits. This course will examine the family with an emphasis on parent/child interactions. In addition, a model for ecological intervention will be discussed.

TLCI 821. Advanced Curriculum Design and Development. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Focuses on the process of building a curriculum, historical developments in curriculum design, alternative curricula, current and future trends in curricular innovations, and research in curriculum development.

TLCI 822. Curriculum Seminar in Content Areas. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Investigates the role and nature of the curriculum for particular subject-matter specialties — e.g., math, social studies, science, English, school librarianship, reading, etc. Objectives are tailored to specific content areas.

TLCI 824. Readings in Contemporary Society. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Surveys the literature related to the issues and trends in contemporary society and provides educators with a substantive base in the philosophy, history, theory, strategies and multicultural perspectives relevant to curriculum development.

TLCI 826. Advanced Supervision of Reading Programs. 3 Credits.
Lecture 3 hours; 3 credits. Explores various models of supervision and relates them to the administration and supervision of reading programs. Also prepares the prospective administrator/supervisor to make decisions relative to the methods and materials used to teach reading.

TLCI 827. Advanced Practicum in Reading. 3 Credits.
3 credits. This course is designed for teachers having completed the initial reading practicum. Its focus is on the refinement and further exploration of ways to work with students experiencing reading difficulties. Both group and individual tutoring experiences will be provided. Ways will be explored to encourage involvement in existing educational programs and schools.

TLCI 828. Contemporary Issues in Literacy Research. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: M.S.Ed. in Reading Education. Directed study of current topics of interest to students involved in literacy research. Topics to include emergent literacy assessment, adult literacy programs, and other areas of investigation. Students will be required to prepare a scholarly paper reporting results for publication.

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Lecture. 3 credits. This seminar will explore philosophical orientations toward early childhood education, current research in the field, and the implication of this research for policy and practice. Students will focus on research within a community of practice orientation by linking current research and policy to current practices and issues in the field.

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Lecture 3 hours; 3 credits. The influence of the home, the community and classroom on the achievement of at-risk children is examined. Successful teaching strategies and behavioral interventions also are discussed as well as the need to search for viable alternatives to strategies of past school reforms.

TLCI 837. Schools and Families: Enriching the Partnership. 3 Credits.
Lecture 3 hours; 3 credits. A critical examination and analysis of current trends in education as they affect the family and school will be addressed. Emphasis will be placed on the need for parent involvement and support in the child’s education.

TLCI 839. Cross Cultural Perspectives in Early Childhood Education. 3 Credits.
Lecture 3 hours; 3 credits. This course will address the socialization process as a component of the broad perspective of a child’s life. Curriculum development and how it is affected by the cultural context of an educational system will be discussed, as well as the impact of current trends on research and pedagogy in early childhood education.

TLCI 840. Issue in Early Language and Literacy. 3 Credits.
Lecture, 3 hours; 3 credits. This course follows a theory into practice philosophy, examining language acquisition and early literacy, teaching practice and learning. Students examine, develop and use advanced instructional strategies, materials, technologies, and activities to promote language and literacy development. The impact of formative assessment on instruction and curricular decision-making as well as cultural, social, familial, and multilingual issues will be addressed.

TLCI 841. Change Issues in Curriculum and Instruction. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Explores questions and issues related to the evolving nature of curriculum and instruction and the design of the contemporary curriculum. Through readings and projects, students will examine new discoveries in research and technology, the effect of these and other changes on education, and the challenges of life-long learning as an influence on change.

TLCI 852. Curriculum Problems in Urban Schools and Society. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Studies major curriculum problems and issues in urban education today and discusses how the changing urban environment affects curriculum planning and decision making.

TLCI 872. Advanced Developmental Process. 3 Credits.
Lecture 3 hours; 3 credits. This course is designed to examine the theoretical basis for alternative views of the nature of human development. Students’ understanding of topical areas in child development will be enhanced through an examination of current research in child development and relevant findings from cross-cultural study.

TLCI 874. Constructivist Teaching. 3 Credits.
Lecture 3 hours; 3 credits. This course addresses Piaget’s theory of cognitive and moral developments. Students will learn techniques for studying the behavior and development of young children. Analysis of constructivist research, replicated empirical work, and implications for planning learning environments and education programs for young children will be emphasized.

TLCI 877. Program Evaluation in Education. 3 Credits.
Lecture 3 hours; 3 credits. Examines procedures and problems in the design and utilization of program evaluation in education. Identifies evaluation purposes and the methods of evaluation especially as affected by organizational behavior, ethical considerations, and political influences. Evaluation methodology includes but is not limited to design considerations, data utilization, and teacher evaluation. Both quantitative and qualitative strategies will be covered.

TLCI 888. Seminar in the Multicultural Environment. 3 Credits.
Lecture 3 hours; 3 credits. Explores topics related to the cultural characteristics of ethnically diverse populations and how these diverse populations and characteristics interact with social, political and economic institutions and the dominant culture to create the contemporary environment.

TLCI 891. Dissertation Seminar. 3 Credits.
Lecture 3 hours; 3 credits. This seminar helps ECI doctoral students develop their skills and knowledge about the research process and assists them in developing a dissertation proposal. Students engage in debate and critique their oral and written dissertation proposals. Successful completion of the class does not guarantee a successful dissertation proposal. Dissertation proposals are approved by the student’s dissertation committee.

TLCI 895. Topics in Education. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits. Provides opportunities for doctoral students to explore topics related to curriculum, instructional strategies, and evaluation.

TLCI 897. Independent Study. 1-3 Credits.
Hours to be arranged; 1-3 credits. Provides opportunities for the doctoral student to do independent research in an area of his/her particular interests and needs.

TLCI 899. Dissertation. 1-12 Credits.
1-12 credits. Prerequisites: graduate standing, successful completion of candidacy exam and permission of the instructor.

TLCI 999. Teaching and Learning Curriculum and Instruction 999. 1 Credit.

TLED - Teaching & Learning-Education

TEACHING LEARNING-EDUCATION Courses

TLED 506. Teaching in the Multicultural Classroom. 3 Credits.
Lecture 3 hours; 3 credits. Explores the teaching strategies, materials and understandings needed in developing responsive classroom environments for children from diverse cultural, ethnic, economic and linguistic backgrounds.

TLED 530. PK-12 Instructional Technology. 3 Credits.
Lecture 3 hours; 3 credits. Classroom technology and learning strategies are explored through research and synthesized through projects and a research paper (530 students only). The course uses contemporary productivity tools and Internet resources to develop and evaluate classroom management techniques and K-12 standards-based curriculum materials. The course addresses the NETS Teachers Standards and the Technology Standards for Instructional Personnel (TSIP).
TLED 532. Developing Instructional Strategies PreK-6: Language Arts. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: TLED 530 and 568. Following a theory into practice philosophy, students explore, develop, and use instructional strategies, materials, technologies, and activities to promote children’s development of attitudes, behaviors, and concepts in language arts in grades PreK-6 in support of NCTE national instructional standards and the Virginia Standards of Learning.

TLED 535. Developing Instructional Strategies PreK-6: Social Studies. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: TLED 530. Following a theory into practice philosophy, students explore, develop, and use instructional strategies, materials, technologies, and activities to promote children’s development of attitudes, behaviors, and concepts in social studies in grades PreK-6 in support of NCSS national instructional standards and the Virginia Standards of Learning.

TLED 551. Developing Instructional Strategies for Teaching in the Middle/High School: English. 3 Credits.
Following a theory/research-into-practice philosophy, students explore, develop, and use instructional strategies, materials, technologies, and activities to promote the development of attitudes, behaviors, and concepts in English, grades 6-12, informed by national instructional standards and the Virginia Standards of Learning; 35 hours of teaching practicum required. Prerequisites: TLED 530, or TLED 677, passing scores on PRAXIS I or equivalent SAT scores as established by VA Board of Education, a criminal background check, acceptance into teacher education, no grade less than C- in content area and professional education core, minimum major and overall GPA of at least 2.75. (Additional prerequisites for MCTP students are ECI 608 and 616.)

TLED 555. Developing Instructional Strategies for Teaching in the Middle/High School: Social Studies. 3 Credits.
Following a theory/research-into-practice philosophy, students explore, develop, and use instructional strategies, materials, technologies, and activities to promote the development of attitudes, behaviors, and concepts in social studies, grades 6-12, informed by national instructional standards and the Virginia Standards of Learning; 35 hours of teaching practicum required. Prerequisites: TLED 530, or TLED 677, passing scores on PRAXIS I or equivalent SAT scores as established by VA Board of Education, a criminal background check, acceptance into teacher education, no grade less than C- in content area and professional education core, minimum major and overall GPA of at least 2.75. (Additional prerequisites for MCTP students are ECI 608 and 616.)

TLED 558. Language Acquisition and Reading for Students with Diverse Learning Needs. 3 Credits.
Lecture 3 hours; 3 credits. This course provides an overview of normal language development and language disorders which impact the acquisition of language based curriculum skills such as listening, speaking, reading, and written expression. Emphasis is on instructional techniques to assist students with diverse learning needs to achieve reading and comprehension skills. Effective reading strategies and curricula for individuals with disabilities will also be reviewed.

TLED 574. Foundations and Contemporary Issues in Early Childhood Education. 3 Credits.
Lecture 3 hours; 3 credits. This course introduces students to objectives, curricula, and organization of early childhood education as it is practiced throughout the United States and other countries. Foundations of education programs and current research and practices related to the education of young children will be addressed with an emphasis on sociological, cultural, historical, and philosophical factors.

TLED 578. Integrating Instruction Across the Curriculum PreK-6. 3 Credits.
Following a theory into practice philosophy and building on the instructional strategies for specific disciplines, students explore, develop, and use advanced instructional materials, technologies, and activities to promote interdisciplinary and multidisciplinary instruction across the curriculum in grades PreK-6 in support of national standards and the Virginia Standards of Learning. The field experience component (40 hours) includes participation in prek-3 and 4th-6th grade classrooms in an accredited public or non-public school, per program requirement. Prerequisites: TLED 301 or TLED 290, passing scores on PRAXIS I or met equivalent scores as established by VA Board of Education, a criminal background check, acceptance into teacher education, no grade less than C in content area and professional education core, minimum major overall GPA of at least 2.8 and at least two of the following courses: TLED 532, TLED 535, STEM 533, and STEM 534.

TLED 579. Classroom Management and Practice PreK-3; PreK-6. 3 Credits.
Course prepares prospective PreK-3 and PreK-6 teachers to provide instruction and management addressing the intellectual, physical, emotional and social needs of PreK-6 learners founded in empirically based practice. The field based component (70 hours) includes participation in Prek-3 and 4th-6th grade classrooms in an accredited public or non-public school. Students in the Prek-3 program are required to complete 35 hours in the Child Development Center. Attendance at seminars and debriefing sessions is required. Prerequisites: TLED 301 or 290, passing scores on PRAXIS I or met equivalent scores as established by VA Board of Education, a criminal background check, acceptance into teacher education, no grade less than C in content area and professional education core, minimum major and overall GPA of at least 2.8 and at least two of the following courses: TLED 432/532, 435/535, 478/578; STEM 433/533, 434/534.

TLED 583. Seminar in Teacher Education. 1 Credit.
Lecture 1 hour; 1 credit. Corequisite: students enrolling in TLED 551, STEM 553, STEM 554 and TLED 555 must also enroll in TLED 583. Prerequisite: admitted to approved teacher education program. This course explores issues, problems, concerns, and processes related to teaching and entering the profession of teaching. Passing score on PRAXIS II in licensure content area, passing scores on the Virginia Communication and Literacy Assessment (VCLA), and where appropriate passing scores on the Virginia Reading Assessment (VRA) are required to pass this course.

TLED 586. Student Teaching for Special Endorsement. 3-6 Credits.
Internship in school. Available for pass/fail grading only. Prerequisites: Collegiate Professional Certificate and/or completion of an approved program in teacher education, passing scores on PRAXIS I or equivalent SAT or ACT scores as established by VA Board of Education, passing scores on the appropriate PRAXIS II content examination, passing score on the Virginia Communication and Literacy Assessment, departmental approval, permission of the director of teacher education services, meet grade requirement in the specific content area and professional education core, minimum major and overall GPA of at least 2.75, and a criminal background check. (qualifies as a CAP experience).

TLED 592. Integrating Mathematics and Science Across the Curriculum, PK-3. 3 Credits.
Lecture 3 hours; 3 credits. This course has a theory-into-practice goal. The focus for this class will be to develop and use teaching strategies and techniques in the content area of mathematics and science, which are based on Piaget’s theory of constructivism and are compatible with the NCIM & NSE Standards and the Virginia SOLs. Practical ways of encouraging thinking about math and science by young children, PK-3, and the natural integration of these subjects across the early childhood curriculum will be emphasized.
TLED 593. Integrating Children’s Literature, Language Arts and Social Studies Across the ECE Curriculum. 3 Credits.
Lecture 3 hours; 3 credits. This course offers a review of literary materials suitable for nursery, kindergarten and early elementary school children. Social issues affecting children and early childhood literature related to these issues, the use of teaching strategies and techniques in the content areas of history, geography, economics and civics which are based on Piaget’s theory of constructivism, the National Council of Teachers of English and the National Council for the Social Studies standards, and the Virginia SOLs are emphasized.

TLED 595. Topics in Education. 1-4 Credits.
Lecture 1-4 hours; 1-4 credits. Prerequisite: graduate standing. Explores contemporary problems and trends in education. Emphasis is placed upon topics related to curriculum, instructional strategies, and evaluation.

TLED 596. Topics in Education. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits. Prerequisite: graduate standing. Cannot be applied to a Master of Science in Education degree in the Department of Educational Curriculum and Instruction. Explores contemporary problems and trends in education. Emphasis is placed upon topics related to curriculum, instructional strategies, and evaluation.

TLED 597. Topics in Education. 1-3 Credits.
Lecture to be arranged: 1-3 credits. Prerequisite: graduate standing. Allows the student to engage in independent study of issues and trends in education. Emphasis is placed upon topics related to curriculum, instructional strategies, and evaluation.

TLED 598. Topics in Education. 1-3 Credits.
Lecture to be arranged: 1-3 credits. Prerequisite: graduate standing. Allows the student to engage in independent study of issues and trends in education. Emphasis is placed upon topics related to curriculum, instructional strategies, and evaluation.

TLED 608. Foundations of Education and Instructional Assessment. 3 Credits.
Prerequisites: graduate standing. Provides students with an understanding of historical, philosophical, economic, and sociological issues in American education, their effect on student achievement, and the impact of social change on existing institutions. Includes the development of instruction based on assessment data including the use, construction, interpretation, and analysis of valid assessments. A 30-hour observation/participation experience is required in an appropriate prek-6, 6-8, or 6-12 grade level.

TLED 615. Teaching in the Middle School. 4 Credits.
Lecture 4 hours; 4 credits. Prerequisite: Graduate standing. Focusing on middle school teaching, this course examines the organization, curriculum, instructional strategies, classroom management techniques, and teaching methods for working with young adolescents. Also covered are middle school guidance, exploratories, scheduling, and parent-school relations. A 30-hour practicum in a middle school is required.

TLED 616. Design for Effective Instruction. 3 Credits.
Lecture 3 hours; 3 credits. Assists students in the organization of research on effective teaching for application in diversified classroom settings. Decision-making in the areas of content, learner behavior, and teacher behavior is stressed. Students learn the fundamentals of lesson design and basic instruction through a unit plan project and teaching vignettes.

TLED 619. Classroom Research and Assessment in Curriculum and Instruction. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Graduate standing. Students admitted to elementary/middle school education prior to July 1, 2000, must take this course with TLED 669. Students will learn research techniques such as designs and data collection by conducting their own research studies with pupils in grades K-12. Measurement and evaluation principles and procedures for assessing and promoting children’s learning and development will be addressed as will the interpretation of standardized tests.

TLED 622. Transitioning from Master Teacher to Mentor Teacher. 1 Credit.
1 hour on-line module. 1 credit. Prerequisite: Licensed teacher, 3 years of experience, recommendation from school division. The course provides information in five areas through online modules identified by teaching staff and human resource officials to develop mentor teachers. These five areas are: professionalism, collaboration, classroom/behavior management, differentiation of instruction, and diversity.

TLED 630. Develop and Enhancing Literacy with Culturally and Linguistically Diverse Learner Across Content Areas. 3 Credits.
Lecture 3 hours, 3 credits. This course focuses on the development and implementation of strategies that will accommodate how language and cultural differences affect communication and learning; knowledge of the impact of language-based curriculum skills such as listening, speaking, reading, and writing; instructional techniques needed to assist individuals identified as culturally, linguistically, and academically diverse in achieving reading and comprehension skills; comprehension strategies; and an understanding of reading across the disciplines.

TLED 636. Problems in Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: TLED 635. Provides practice in the use of quantitative or qualitative techniques, including analytical processes, in solving problems in education. Pass/Fail grading only.

TLED 638. Dynamic Assessment of Teaching and Learning. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. In this first course in the Field Based Graduate Program, students conduct an extensive qualitative and/or quantitative assessment of the teaching/learning dynamic in K-12 school settings. The assessment will include school culture, student demographics, curriculum, instructional practices, technology, and other critical components of teaching and learning. Analysis of the assessment will result in a document that emphasizes a professional development plan.

TLED 639. Seminar in Education. 3 Credits.
Hours to be arranged: 3 credits. Prerequisite: 15 graduate hours in education, including all core courses. Explores in depth a variety of current topics, trends and concerns in K-12 education.

TLED 640. The Management of Learning and Instruction. 3 Credits.
Lecture 3 hours; 3 credits. Explores projects and develops individual projects in many aspects of education and describes learners—how they learn and how teachers can facilitate their learning.

TLED 648. Digital Media for Educators. 3 Credits.
Lecture 3 hours; 3 credits. Course surveys a variety of tools, techniques and technologies, as well as strategies and common practices in the design and development of digital learning products using contemporary software such as Acrobat, Flash, Graphic Conveter along with standard productivity tools. Students will gain hands-on experience in the creation of digital media elements suitable for use in traditional and distributed learning environments. Includes design and technical considerations of graphics manipulation and design, sound and video elements, and animation.

TLED 652. Language Arts in the Elementary/Middle School. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Examines the teaching of oral and written expression, reading, spelling, and handwriting and describes conditions necessary for children’s optimum development in the language arts.

TLED 655. Social Studies in the Elementary/Middle School. 3 Credits.
Lecture 3 hours; 3 credits. Includes advanced preparation of instructional objectives, evaluation procedures, instructional resources, classroom activities, and lesson development, and describes current social studies curriculum projects as well as current trends in the teaching of social studies.

TLED 656. Developing Instructional Strategies for Elementary Education. 3 Credits.
Lecture 3 hours; 3 credits. For MCTP students only. This course will focus on the selection of appropriate skills and objectives students require in their learning. Emphasis will be on how to determine which concepts should be taught and on which method/methods best suit both the objectives and the student. Information from previous courses will be taken to the next level of difficulty (i.e. task analysis, sequencing of objectives, and unit planning).
TLED 657. Language Arts Methods for Middle and Secondary School. 3 Credits.
Lecture 3 hours; 3 credits. For MCTP students only. This course is designed to teach prospective educators the components of language arts. Particular emphasis will be placed on analyzing the standards of learning for both disciplines, and the planning, development, and implementation of interdisciplinary units of study for middle and secondary school students.

TLED 662. Social Studies Methods for Middle and Secondary School. 3 Credits.
Lecture 3 hours; 3 credits. For MCTP students only. Course will provide pre-service teachers the opportunity to learn and make application of teaching methodologies appropriate for the secondary and middle school classrooms. Embracing the purpose of the social studies, the course will emphasize the integrated study of the social sciences and humanities, drawing upon such disciplines as anthropology, archaeology, economics, geography, history, law, philosophy, political science, psychology, religion, and sociology, as well as appropriate content from the humanities, mathematics, and the natural sciences.

TLED 665. Digital Video Materials Development. 3 Credits.
Lecture 3 hours; 3 credits. Design, development, and production of digital video and the use of video as an instructional component. Students will utilize teaching and learning theory to determine the effective use of video, and how to create video segments to enhance the understanding of appropriate knowledge chunks. In addition, technical aspects of digital media delivery in contemporary transmission systems will be explored.

TLED 666. Internship/Student Teaching and Seminar. 9 Credits.
Five days per week for 14 weeks; 9 credits. Prerequisites: completion of an approved program in teacher education, 6-8, passing scores on PRAXIS I or equivalent SAT or ACT scores as established by VA State Board of Education, passing scores on the appropriate PRAXIS II content examination, departmental approval, permission of the director of teacher education services, no grade less than C- in content area and professional education core, minimum major and overall GPA of at least 2.75. Available for pass/fail grading only. Provides practice in teaching in grades 6-8 and in analyzing teaching approaches and behaviors. Examines instructional problems and concerns.

TLED 668. Internship/Student Teaching and Seminar. 9 Credits.
Five days per week for 14 weeks; 9 credits. Prerequisites: completion of an approved program in teacher education PreK-6, passing scores on PRAXIS I or equivalent SAT or ACT scores as established by VA State Board of Education, passing scores on the appropriate PRAXIS II content examination, departmental approval, permission of the director of teacher education services, no grade less than C- in content area and professional education core, minimum major and overall GPA of at least 2.75. Available for pass/fail grading only. Provides practice in teaching in grades PK-6 and in analyzing teaching approaches and behaviors. Examines instructional problems and concerns.

TLED 669. Internship/Student Teaching and Seminar. 3-9 Credits.
Five days per week for 6-14 weeks; 3-9 credits. Available for pass/fail grading only. Provides practice in teaching and in analyzing teaching approaches and behaviors. Examines instructional problems and concerns. Prerequisites: Completion of an approved program in teacher education, passing scores on the appropriate licensure assessments, departmental approval, permission of the director of teacher education services, no grade less than C- in content area and professional education core, minimum major and overall GPA of a least 2.75, GPA of 3.0 required for graduate programs.

TLED 670. Assessment and Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. Students will design a three-chapter research proposal and study the appropriate statistical references. Evaluation methodologies leading to this research are explored (portfolio/rubrics). Instructional technology and its classroom applications are interwoven into research and evaluation.

TLED 677. Advanced Child Development Theory and Research. 3 Credits.
Lecture. 3 cr. This course focuses on developing an in-depth understanding of major theories of children’s learning and development as well as all aspects of their physical, social, emotional, and intellectual development from birth through adolescence. The course requires that students learn the concepts and terminology associated with each theory and be able to use these in analyzing, interpreting, promoting, and evaluating children’s growth and learning in the classroom. Research related to the classroom application of these theories is examined and evaluated based on principles of research design and interpretation.

TLED 679. Advanced Classroom Management and Practicum in PreK-6. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECI 536 for students in the PreK-6 curriculum. This course will examine advanced methods for educators to use in order to make their classroom teaching and management more efficient and effective. This will include supervised involvement of the student in a practicum setting where the student, instructor and classroom teacher work together closely to develop knowledge and gain expertise in teaching children in a positive and effective learning environment. A weekly seminar is required.

TLED 680. Practicum in Early Childhood. 1-6 Credits.
1-6 credits. Supervised involvement of the student in a practicum setting where the student and the instructor work together closely to develop curriculum and gain expertise in teaching specific topics of importance to early childhood educators. A weekly seminar is required.

TLED 690. The Child and the Family. 3 Credits.
Lecture 3 hours; 3 credits. This course will examine children in the context of the families in which they live. Family systems theory provides the basis for study, and students do an in-depth examination of their own families of origin. The stages of the family life cycle are taught; principles of healthy family functioning are emphasized to promote healthy growth for children.

TLED 695. Topics in Education. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits. Prerequisite: Graduate standing. Provides opportunities for graduate students to explore current topics, trends and issues related to curriculum, instructional strategies, and evaluation.

TLED 697. Topics in Secondary School Instruction. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits. Prerequisite: Graduate standing. Provides offerings in several content areas to meet the needs of graduate students in secondary education.

TLED 698. Thesis. 3-6 Credits.
6 credits. Prerequisites: graduate standing and permission of the instructor. Master’s-level research and thesis in topics related to curriculum, instructional strategies, and evaluation in educational settings.

TLED 699. Thesis. 3-6 Credits.
6 credits. Prerequisites: graduate standing and permission of the instructor. Master’s-level research and thesis in topics related to curriculum, instructional strategies, and evaluation in educational settings.

TLED 710. Models of Parent, Child, Social Interaction. 3 Credits.
Lecture 3 hours; 3 credits. This course will examine the family with an emphasis on parent/child interactions. In addition, a model for ecological intervention will be discussed.

TLED 810. Models of Parent, Child, Social Interaction. 3 Credits.
Lecture 3 hours; 3 credits. This course will examine the family with an emphasis on parent/child interactions. In addition, a model for ecological intervention will be discussed.

TLED 999. Educational Curriculum and Instruction. 1 Credit.
1 credit. A one-hour pass/fail registration required of all graduate students to maintain active status during the final semester prior to graduation. After successfully passing the candidacy examination, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.
WMST - Women's Studies

WOMEN'S STUDIES Courses

WMST 500. U.S. Women's Activism. 3 Credits.
This course historicizes U.S. women's social, political, and rhetorical activism over the last 200 years, tracing their entry into and shaping force upon public life. The course examines the development of women's activism in the nineteenth century, the twentieth-century women's (or feminist) movement, and its current status, particularly in relation to postfeminism and a "third" wave.

WMST 501. Women: A Global Perspective. 3 Credits.
An analysis of the global forces that impact women’s lives throughout the world. Particular emphasis is placed on the status of women in the developing world, international institutions that protect women’s rights, and efforts to promote gender equality worldwide. (This is a writing intensive course.).

WMST 514. Motherhood: Texts and Images. 3 Credits.
This course examines the role of the mother, the experience of mothering and the institution of motherhood through a number of disciplinary and theoretical lenses. It considers how motherhood functions to women’s advantage or disadvantage in professional and economic areas as well as the mother’s ideological construction in public discourse, imagery, non-fiction, and film.

WMST 560. Feminist Theory. 3 Credits.
A study of the renaissance in feminist theory since the 1960s through close readings of key documents and texts. The course covers a variety of feminist perspectives as expressed in both theory and practice. (This is a writing intensive course.).

WMST 570. Feminist Research Methods. 3 Credits.
This course explores the ethics, practice, and multiple forms of conducting feminist research. Narrative research methods are practiced through hands-on oral herstory assignments. Throughout the course, the process of knowledge construction is interrogated from a feminist perspective.

WMST 595. Topics in Women's Studies. 3 Credits.
Advanced seminars on selected topics. The subject matter is usually be interdisciplinary. These seminars are more fully described on the women’s studies website and in material distributed each semester to academic advisors.

WMST 596. Topics in Women's Studies. 3 Credits.
Advanced seminars on selected topics. The subject matter is usually be interdisciplinary. These seminars are more fully described on the women’s studies website and in material distributed each semester to academic advisors.

WMST 597. Independent Study. 1-6 Credits.
1-6 credits. Prerequisite: at least one women’s studies course. Independent study of an interdisciplinary women’s studies topic, or a reading plus internship project to be selected under the direction of a women’s studies faculty member. Conferences and papers as appropriate. Tutorial work, either library-based or field work, must be approved by the instructor and the women’s studies chair before a student may enroll in the course. No more than three credits of tutorial work may be counted within the basic requirements for the women’s studies minor or major.

WMST 598. Independent Study. 1-6 Credits.
1-6 credits. Prerequisite: at least one women’s studies course. Independent study of an interdisciplinary women’s studies topic, or a reading plus internship project to be selected under the direction of a women’s studies faculty member. Conferences and papers as appropriate. Tutorial work, either library-based or field work, must be approved by the instructor and the women’s studies chair before a student may enroll in the course. No more than three credits of tutorial work may be counted within the basic requirements for the women’s studies minor or major.

WMST 668. Internship. 3-6 Credits.
3-6 credits. Prerequisites: graduate standing and instructor approval required. Course provides an opportunity to gain experience working in organizations and government agencies. Students’ work should engage with women’s issues at the local, regional, national, and/or global levels. Students must work for at least 50 hours per course credit.

WMST 695. Selected Topics in Women’s Studies. 3 Credits.
The advanced study of selected topics which permit small groups of qualified students to work on subjects of mutual interest under the direction of an instructor. Courses may not be offered regularly; when offered courses appear in the course schedule and are more fully described in information distributed to advisors.

WMST 696. Topics in Women’s Studies. 1-3 Credits.

WMST 697. Independent Study. 3 Credits.
3 credits each semester. Prerequisite: graduate standing. Independent study of an interdisciplinary women’s studies topics to be selected under the direction of a women’s studies faculty member. Conferences and papers as appropriate.

WMST 698. Independent Study. 3 Credits.

WMST 795. Selected Topics in Women’s. 3 Credits.
Prerequisites: Instructor approval. The advanced study of selected topics that permit small groups of qualified students to work on subjects of mutual interest under the direction of an instructor. Courses may not be offered regularly; when offered courses appear in the course schedule and are more fully described in information distributed to advisors.

WMST 797. Independent Study. 1-3 Credits.
1-3 credits. Prerequisite: graduate standing; doctoral level only for 897. Independent study of an interdisciplinary women’s studies topic to be selected under the direction of a women’s studies faculty member. Conferences and papers as appropriate.

WMST 897. Independent Study. 1-3 Credits.
1-3 credits. Prerequisite: graduate standing; doctoral level only for 897. Independent study of an interdisciplinary women’s studies topic to be selected under the direction of a women’s studies faculty member. Conferences and papers as appropriate.
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