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<td>CSD - Communication Sci &amp; Disorders</td>
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<td>DANC - Dance</td>
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<td>DNTH - Dental Hygiene</td>
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<td>ECE - Elect Computer Engineering</td>
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<td>ESPR - Exercise Sci, Sport, Pe, Rec</td>
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<td>FIN - Finance</td>
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<td>HLSC - Health Sciences</td>
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ACCT - Accounting

ACCOUNTING Courses

ACCT 601. Accounting for Managers. 3 Credits.
Lecture and discussion 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: ACCT 601 or equivalent. Standards, ethics, and practice of operational auditing particularly as it concerns the internal auditing profession, as well as exposure to financial auditing.

ACCT 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 IT 624).

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

ACCT 626. Financial and Global Accounting. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: ACCT 601 or equivalent. 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.

ACCT 630. Financial Statement Analysis. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
1-3 credits. Prerequisite: permission of the departmental chair in accordance with departmental Cooperative Education policies and approval of Career Management. Student participation in a full-time professional work experience.

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

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

ACCT 727. Strategic Cost Management. 3 Credits.
Lecture and discussion 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: 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.

AL - Arts And Letters

ARTS AND LETTERS Courses

AL 695. Topics. 1-3 Credits.

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

AL 797. Tutorial Work in Arts and Letters Topics. 1-3 Credits.
1-3 credits.

AL 895. Topics. 1-3 Credits.
1-3 credits. Prerequisite: advanced graduate standing. Seminar on special interdisciplinary topics for small groups of qualified students.

AL 897. Tutorial Work in Arts and Letters Topics. 1-3 Credits.

ANTR - Anthropology

ANTHROPOLOGY Courses

ANTR 695. Topics in Anthropology. 1-3 Credits.
1-3 credits each semester. 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 all graduate advisors.

ANTR 696. Topics in Anthropology. 1-3 Credits.
1-3 credits each semester. 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 all graduate advisors.
ART - Art History

ART HISTORY Courses

ARTH 600. Graduate Seminar: Art Criticism. 3 Credits.
Lecture 3 hours; 3 credits. An examination of critical methodologies as they relate to art, with readings in the recent past and the contemporary scene. Required of all M.A. and M.F.A. students.

ARTH 610. Visual Arts Across Media and Time. 3 Credits.
Lecture 3 hours; 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, discussion, critical analysis, and creative work, students will engage with ideas and artwork across the broad spectrum of contemporary education.

ARTH 668. Internship. 3 Credits.
3 credits. A structured work experience in a museum, gallery, or related arts setting.

ARTH 695. Special Topics in Art History. 1-3 Credits.
Lecture 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.
Lecture 1-3 credits. Individually arranged with the appropriate professor and with the permission of the graduate program director.

ARTS - Art, Studio

ARTS, STUDIO Courses

ARTS 610. Visual Arts Across Media and Time. 3 Credits.
Lecture, 3 hours. 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.
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.
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 999. Audit Registration. 1 Credit.

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 Physiological 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.
BIMD 825. Neurocytology and Ultrastructure of the Nervous System. 2 Credits.
BIMD 826. Medical Histology. 5 Credits.
BIMD 839. Topics Biochemical and Molecular Biology. 1 Credit.
BIMD 840. Topics Molecular Biology. 3 Credits.
BIMD 841. Introduction to Research Literature. 1 Credit.
BIMD 842. Topics in Molecular and Integrative Biomedical Sciences. 1 Credit.
BIMD 843. Foundations of Molecular Biology. 3 Credits.
BIMD 845. Molecular Cytogenetics. 4 Credits.
BIMD 846. History of Genetics. 3 Credits.
BIMD 847. Mammalian Reproduction. 3 Credits.
BIMD 848. Concepts in Cellular Biology and Physiology. 3 Credits.
BIMD 849. Topics in Molecular and Cellular Immunology. 2 Credits.
BIMD 851. Neuroendocrinology. 1 Credit.
BIMD 852. Animal Virology. 3 Credits.
BIMD 853. Special Topics in Genetics. 1 Credit.
BIMD 854. Tumor Biology. 3 Credits.
BIMD 855. Advanced Cardiovascular Sciences. 3 Credits.
BIMD 857. Current Topics in Cardiovascular Science. 1 Credit.
BIMD 856. Neuropharmacology. 3 Credits.
BIMD 871. Advanced Endocrinology. 3 Credits.
BIMD 872. Biochemical and Physiological Bases of Nutrition. 3 Credits.
BIMD 873. Responsible Conduct in Science. 1 Credit.
BIMD 874. Topics in Growth Factor Physiology. 1 Credit.
BIMD 876. Advanced Cardiovascular Sciences. 3 Credits.
BIMD 877. Current Topics in Cardiovascular Science. 1 Credit.
BIMD 878. Advanced Endocrinology. 3 Credits.
BIMD 890. Applied Statistics for Biomedical Research. 4 Credits.
BIMD 895. Special Topics in Biomedical Sciences. 1-3 Credits.
BIMD 897. Seminar. 1 Credit.
BIMD 898. Research. 1-6 Credits.
BIMD 899. Dissertation. 1-6 Credits.

BIOL - Biological Sciences

BIOLOGICAL SCIENCES Courses

BIOL 605. Current Biological Concepts. 3 Credits.
Lecture 3 hours; 3 credits. A biology refresher course which will also update students as to major biological concepts concerning cell structure and function, genetics, diversity and ecology. Emphasis will be placed on the development of projects teachers may use for classroom presentations. The course cannot be used by graduate-level students in fulfilling their graduate program course requirements.

BIOL 608. Graduate Seminar in Biology. 1 Credit.
1 credit. Presentation of reports or reviews of history or literature, and discussion by graduate students, staff and visiting scientists on modern developments in biology.

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

BIOL 620. Biometry. 4 Credits.
Lecture 4 hours; 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.
BIOL 632. Marine Microbiology. 4 Credits.
Lecture 3 hours; laboratory 3 hours; 4 credits. A study of marine microorganisms in relation to their environment. Emphasis is placed on the influence of physical and chemical factors on the distribution and function of microorganisms in the marine environment.

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. Lecture. 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. Topics in Biology. 1-3 Credits.
1-3 credits. Instructor approval required. Prerequisite: BIOL 520. A systematic survey of fishes emphasizing life history, anatomy, identification and classification.

BIOL 707. Ecosystem Ecology. 5 Credits.
Lecture 3 hours; laboratory 4 hours; 5 credits. Prerequisite: a general ecology course. 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.

BIOL 708. Ecological Sciences Seminar. 1 Credit.

BIOL 712. Biological Microscopy. 4 Credits.
Lecture 1 hour; laboratory 6 hours; 4 credits. Prerequisite: permission of the instructor. Lectures will cover theory and concepts of specimen preparation and operation of scanning and transmission electron microscopes. The laboratory experience will include all phases of electron microscopy from specimen preparation to finished micrograph.

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.
Lecture 2 hours; laboratory 2 hours; 3 credits. Prerequisite: BIOL 520. A systematic survey of fishes emphasizing life history, anatomy, identification and classification.

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.
Lecture 3 hours; 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.
Lecture, 2 hours; lab, 2 hours; 3 credits. This course is designed to introduce students to geographic information systems through examples and applications in the life sciences.

BIOL 733. Marine Microbiology. 3 Credits.
Lecture 3 hours; 3 credits. Instructor approval required. Prerequisite: BIOL 315 or BIOL 640 or permission of instructor. The course covers the distribution, abundance, and biogeochemical activities of microorganisms in the ocean, with emphasis on prokaryotic microbes and viruses. Symbioses with higher organisms, and applied aspects of marine microbiology, including biofouling and corrosion, invasive species, and biotechnology are also addressed. The course includes readings and discussion of current primary literature in the field. Students also demonstrate a laboratory technique, and as final project, prepare and defend a formal grant proposal.

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.
Lecture 3 hours; 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.
Lecture 2 hours; laboratory 4 hours; 4 credits. Prerequisite: BIOL 415 or equivalent. 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.
BIOL 751. Advanced Practices in Ethnobotany. 3 Credits.
Lecture, 3 hours; 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 752. Quantitative Ecology. 4 Credits.
Lecture 4 hours; 4 credits. Prerequisite: Biometry or equivalent. Advanced quantitative approaches as applied to ecological questions. Lecture/discussion/project format will focus on experimental/research design and the uses of multiple regression, descriptive multivariate statistics, multi-factor and multivariate ANOVA, and categorical data analysis. Extensive use of computerized statistical analysis.

BIOL 754. Phylogeny and Molecular Lecture and Laboratory. 5 Credits.
Lecture 3 hours; lab 4 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing and BIOL 523. Current molecular understanding of genetic processes will be reviewed. Applications to areas such as development and evolution will also be covered.

BIOL 756. Phylogeny and Molecular Systematics. 5 Credits.
Lecture, 3 hours; lab, 4 hours. 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.
4 credits. Scientists 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.
Lecture, 3 hours; 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 764. Modeling and Simulation in the Life Sciences. 4 Credits.
Lecture, 3 hours; lab, 2 hours. 4 credits. This course is designed to introduce students to modeling and simulation through examples and applications in the life sciences.
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.

BIOL 820. Systematic Ithology. 3 Credits.
Lecture 2 hours; laboratory 2 hours; 3 credits. Prerequisite: BIOL 520. A systematic survey of fishes emphasizing life history, anatomy, identification and classification.

BIOL 824. 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 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.

BIOL 826. Biochemistry. 3 Credits.

BIOL 830. 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 831. Systematics and Speciation. 3 Credits.
Lecture 3 hours; 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 832. GIS in the Life Sciences. 3 Credits.
Lecture, 2 hours; lab, 2 hours; 3 credits. This course is designed to introduce students to geographic information systems through examples and applications in the life sciences.

BIOL 833. Marine Microbiology. 3 Credits.
Lecture 3 hours; 3 credits. Instructor approval required. Prerequisite: BIOL 315 or BIOL 640 or permission of instructor. The course covers the distribution, abundance, and biogeochemical activities of microorganisms in the ocean, with emphasis on prokaryotic microbes and viruses. Symbioses with higher organisms, and applied aspects of marine microbiology, including biofouling and corrosion, invasive species, and biotechnology are also addressed. The course includes readings and discussion of current primary literature in the field. Students also demonstrate a laboratory technique, and as final project, prepare and defend a formal grant proposal.

BIOL 845. 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 849. Biogeography. 3 Credits.
Lecture 3 hours; 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.
Lecture 2 hours; laboratory 4 hours; 4 credits. Prerequisite: BIOL 415 or equivalent. 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.

BIOL 851. Advanced Practices in Ethnobotany. 3 Credits.
Lecture, 3 hours; 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 852. Quantitative Ecology. 4 Credits.
Lecture 4 hours; 4 credits. Prerequisite: Biometry or equivalent. Advanced quantitative approaches as applied to ecological questions. Lecture/discussion/project format will focus on experimental/research design and the uses of multiple regression, descriptive multivariate statistics, multi-factor and multivariate ANOVA, and categorical data analysis. Extensive use of computerized statistical analysis.

BIOL 854. Phylogeny and Molecular Lecture and Laboratory. 5 Credits.
Lecture 3 hours; lab 4 hours; 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 855. Molecular Genetics. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing and BIOL 523. Current molecular understanding of genetic processes will be reviewed. Applications to areas such as development and evolution will also be covered.

BIOL 856. Phylogeny and Molecular Systematics. 5 Credits.
Lecture, 3 hours; lab, 4 hours. 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 858. Molecular Ecology. 4 Credits.
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 859. Foundations and Principles in Ecology. 3 Credits.

BIOL 861. Ecological Sciences Internship. 3-6 Credits.
3-6 credits. Must have approval of advisory committee.
BME 630. Advanced Bioeletctrics. 3 Credits.
Lecture, 3 hours; lab, 2 hours. 4 credits. This course is designed to introduce students to modeling and simulation through examples and applications in the life sciences.

BME 685. Retroviruses and Retroelements. 3 Credits.
Lecture 3 hours; 3 credits. A course encompassing the biology of infectious retroviruses such as HIV, the human immunodeficiency virus and related elements in the human genome. Students will learn about the structure, genetics, biology, evolution, and diseases associated with retroviruses and endogenous retroelements.

BME 781. 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.

BME 782. Modeling and Simulation in Life Sciences. 4 Credits.
Lecture, 3 hours; lab, 2 hours; 4 credits. Course is designed to introduce students to modeling and simulation techniques using examples and applications in the life sciences.

BME 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 synthetic, and oral presentations are required of each student.

BME 889. Gross Anatomy. 6 Credits.
Lecture 3 hours, laboratory 2 hours; 4 credits. This course is designed to introduce students to modeling and simulation techniques using examples and applications in life sciences.

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

BME 898. Research in Biology. 1-6 Credits.

BME 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 630. Advanced Bioeletctrics. 3 Credits.
Lecture, 3 hours; 3 credits. A one-semester course covering advanced topics in bioeletctrics. 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. 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 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 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.

BME 999. BME 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 for each term until the degree is completed.

BNAL - Business Analytics

Business Analytics Courses

BNAL 600. Foundations of Statistics for Business and Economics. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Descriptive statistics, probability and probability distributions, estimation and hypothesis testing, analysis of variance, simple and multiple regression, and introduction to times 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.
Lecture 3 hours; 3 credits. Instructor approval required. Prerequisite: BNAL 601, OPMT 611. 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.
Lecture 3 hours; 3 credits. Prerequisite: 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). (cross-listed with MSCM 641).

BNAL 667. Cooperative Education. 1-3 Credits.
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.
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.
3 credits. Prerequisite: permission of the department chair and graduate program director.

BNAL 697. Independent Study. 3 Credits.
3 credits. Prerequisite: 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.
Lecture 1 hour; 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.
Lecture 3 hours. Corequisite: BNAL 700. Prerequisite: 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.
Lecture and discussion 3 hours; 3 credits. Prerequisite: 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.
Lecture, 1 hour; 1 credit. Prerequisite: 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.
Lecture 3 hours; 3 credits. Instructor approval required. Prerequisite: MSIM 601 or MSIM 611 or BNAL 476 or BNAL 576. 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.
Lecture 3 hours; 3 credits. Prerequisite: 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.
Lecture 1-3 hours; 1-3 credits. The advanced study of selected topics not offered on a regular basis.

BNAL 800. Theoretical Foundations in ISR. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Instructor approval required. Prerequisite: MSIM 601 or MSIM 611 or BNAL 476 or BNAL 576. 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.
Lecture 3 hours; 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

BUSN 600. Foundations of Business. 12 Credits.
Lecture 12 hours; 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 is an interdisciplinary course, 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.
3 credits. Under the direction of a core faculty advisor, students in the GEMBA program will 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.
Lecture 12 hours; 12 credits. Prerequisite: 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.
3 credits. Prerequisite: BUSN 601. 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.

BUSN 604. International Issues in Business. 12 Credits.
Lecture 12 hours; 12 credits. Prerequisite: 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.
3 credits. Prerequisite: BUSN 603. 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.
BUSN 800. Seminar in International Business. 3 Credits.
Seminar 3 hours; 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.
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.

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 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 786. 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 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 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.

CCL 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 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 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 640. Hydraulic Structures. 3 Credits.

CEE 646. Contingency Readiness and Facility Management with GIS. 3 Credits.

CEE 650. Pollution Prevention. 3 Credits.

CEE 653. Environmental Engineering Law. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: permission of instructor. Provides an introduction to the American legal system in the context of environmental law. Examines the close interrelationships among science, engineering, technology and the law. Develops perspectives on environmental protection and the law.

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.
Lecture 1-3 hours; 1-3 credits. Prerequisite: Permission of the department chair. 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.
ACCT 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.

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

ACCT 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.).

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

ACCT 719. Inelastic Structures. 3 Credits.
Lecture 3 hours; 3 credits. Inelastic analysis and behavior of framed structures.

ACCT 720. Structural Stability. 3 Credits.
Lecture 3 hours; 3 credits. Fundamentals of elastic and inelastic stability of beams, columns and frames.

ACCT 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.

ACCT 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.

ACCT 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.

ACCT 724. Engineering Behavior of Soils. 3 Credits.

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

ACCT 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.

ACCT 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.

ACCT 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.

ACCT 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.

ACCT 747. 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.

ACCT 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.

ACCT 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.

ACCT 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.

ACCT 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.

ACCT 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.

ACCT 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.

ACCT 761. Water Resources Systems Analysis. 3 Credits.
Lecture 3 hours; 3 credits. Application of systems analysis and project evaluation techniques to water resource problems including water demand forecasting, reservoir design and operation, groundwater management and water distribution system design.

ACCT 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.

ACCT 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.

ACCT 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, queuing theory, car following models, and applications of microscopic traffic simulation to corridor studies.
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 776. Simulation in Transportation Networks, 3 Credits.

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.
Lecture 1-3 hours; 1-3 credits. Prerequisite: Permission of the department chair. Special topics of interest with emphasis placed on recent developments in civil and/or environmental engineering.

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 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 organics 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 study of the principles 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 Systems Analysis. 3 Credits.
Lecture 3 hours; 3 credits. Application of systems analysis and project evaluation techniques to water resource problems including water demand forecasting, reservoir design and operation, groundwater management and water distribution system design.

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 progress signals systems, queueing 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. 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 698. Master's Research. 1-9 Credits.
Lecture 1-3 hours; 1-3 credits. Prerequisite: permission of the department chair. Special topics of interest with emphasis placed on recent developments in civil and/or environmental engineering.

CHEM 695. Topics in Civil and Environmental Engineering. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits. Prerequisite: Permission of the department chair. Topics representing the most recent advances in various fields of chemistry and/or environmental engineering.

CHEM 697. Independent Study. 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.

CHEM 699. Dissertation Research. 1-9 Credits.
1-9 credits.

CHEM 999. Civil Engineering 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.

CHEM - Chemistry And Biochemistry

CHEMISTRY AND BIOCHEMISTRY Courses

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, ultramicroelectrodes 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 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 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 600. Principles of Community Health. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
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 MPH 733).

CHP 635. Managed Care. 3 Credits.
Lecture 3 hours; 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.

OLD DOMINION UNIVERSITY 21
COMMUNICATIONS Courses

COMM 600. Intercultural Communication: History, Theory and Application. 3 Credits.
Lecture 3 hours; 3 credits. Students will 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 will 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.
Lecture 3 hours. 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.
Lecture, 3 hours. 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 will both engage with ongoing theoretical debates and participate in various online endeavors that offer real world research opportunities.
COMM 603. Social Change and Communication Systems. 3 Credits.
Lecture, 3 hours; 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: Instructor approval required. 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.
Lecture, 3 hours; 3 credits. Prerequisite: Instructor approval required. 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.
Lecture/seminar, 3 hours; 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.
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 HUM 630).

COMM 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 HUM 640).

COMM 650. Religious Communication. 3 Credits.
Lecture 3 hours; 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.
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 work supervisor and cooperating faculty member are required.

COMM 672. New Communications Media and Social Development. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. This course examines the relationships between race, racial identity and television. Multiple scholarly traditions are used to examine the interactions between television texts, audiences and institution and historical and contemporary race relations.

COMM 685. Lifespan and Digital Communication Capstone Course. 3 Credits.
Lecture/seminar, 3 hours; 3 credits. Prerequisites: COMM 601, 602, 603, 604, and 605. 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. Approval of graduate program director is needed.

COMM 689. Thesis Preparation. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisites: COMM 601, 602, 603, 604, and 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.
Lecture 3 hours; 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.
Prerequisite: approval of department chair. Independent reading and study of a topic under the direction of an instructor. Conferences and papers as appropriate.

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. 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.
Lecture 1-3 hours; 1-3 credits. Prerequisite: permission of instructor. 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.

COMM 797. Independent Research in Communication Studies. 1-3 Credits.
1-3 credit hours. Prerequisite: permission of instructor. Independent research directed by professors/faculty members examining communication topics.

COMM 895. Selected Topics in Communication Studies. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits. Prerequisite: permission of instructor. 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.

COMM 897. Independent Research in Communication Studies. 1-3 Credits.
1-3 credit hours. Prerequisite: permission of instructor. Independent research directed by professors/faculty members examining communication topics.

COUN - Counseling

COUNSELING Courses

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.
Lecture 3 hours; 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.

COUN 634. Advanced Counseling and Psychotherapy Techniques. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: COUN 633. Advanced skills and practice in techniques used by counselors.

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

COUN 644. Group Counseling and Psychotherapy. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: Admission to Counseling Graduate Program or graduate program director approval; COUN 633 & 650. 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.

COUN 645. Testing and Client Assessment. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: Admission to Counseling Graduate Program or graduate program director approval. 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.
Lecture 3 hours; 3 credits. Prerequisites: Admission to Counseling Graduate Program or graduate program director approval; COUN 633 & 650. Examines the etiology, risk factors, assessment, counseling approaches and treatment of alcoholism and other addictions.

COUN 648. Foundations of Career Development. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: Admission to Counseling Graduate Program or graduate program director approval; COUN 633, 645, & 650. 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.

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. 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 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.

COUN 667. Internship in Mental Health Counseling. 1-9 Credits. 3-9 credits. Prerequisite: Admission to the Counseling Graduate Program or graduate program director approval, approved application; COUN 601, 644, 645, 648, 650, 669, 680, & 685. 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.

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. 3 credits. Prerequisites: Admission to the Counseling Graduate Program or graduate director approval; COUN 601, 603, 633, 642 or 644, & 650 (see Program Handbook for other prerequisites based on specialty area). 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.

COUN 670. Introduction to Counseling Supervision. 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: Admission to the Counseling Graduate Program or graduate director approval; COUN 601, 603, 633, 642 or 644, & 650 (see Program Handbook for other prerequisites based on specialty area). 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.

COUN 671. 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. This course will provide an overview of theories and techniques of counseling 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.

COUN 672. Couples Counseling. 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: C Admission to the Counseling Graduate Program or graduate director approval; COUN 633 & 650. Couples counseling focuses on development of effective counseling skills in working with couples.

COUN 673. 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 674. 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 675. College 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 676. School Counseling Program Development K-12. 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: Admission to the Counseling Graduate Program or graduate director approval; COUN 601, 642 or 644, 648, & 676. This course is designed as a capstone experience that synthesizes graduate course work into a practical school counseling program manual. Emphasis will be placed upon the counselor’s role as a facilitator of normal developmental processes to promote academic success.

COUN 677. School Counseling Program Development K-12. 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: Admission to the Counseling Graduate Program or graduate director approval; COUN 601, 642 or 644, 648, & 676. This course is designed as a capstone experience that synthesizes graduate course work into a practical school counseling program manual. Emphasis will be placed upon the counselor’s role as a facilitator of normal developmental processes to promote academic success.

COUN 678. Counseling Children and Adolescents in School Settings. 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: Admission to the Counseling Graduate Program or graduate director approval; COUN 633 & 650. 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.

COUN 679. Counseling Children and Adolescents in School Settings. 3 Credits. Lecture 3 hours; 3 credits. Prerequisites: Admission to the Counseling Graduate Program or graduate director approval; COUN 633 & 650. 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.

COUN 680. Family Education graduate certificate. 3 credits. Prerequisites: 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.
Lecture 3 hours; 3 credits. Prerequisites: Admission to the Counseling Graduate Program or graduate director approval. COUN 633 & 650. 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.

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. Influences of individual differences highlighted. Applications for college counseling, higher education, and community college practitioners, professionals, and leaders.

COUN 742. 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 744. 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 747. Chemical Dependency Counseling. 3 Credits.

COUN 781. 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 795. Topics in Counseling. 1-6 Credits.
Lecture 1-6 hours; 1-6 credits. The study of selected topics in counseling.

COUN 797. Topics in Counseling. 1-6 Credits.
Consultation 1-6 hours; 1-6 credits. Individual study under the supervision of a graduate faculty member.

COUN 801. Current Issues in Counseling and Counselor Education. 3 Credits.
Lecture 3 hours; 3 credits. The course will focus on the current issues in counseling to include the role of ethical and legal considerations in counselor education and supervision, social and cultural issues to include social change theory and advocacy action planning, and developmental counseling.

COUN 807. 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. Influences of individual differences highlighted. Applications for college counseling, higher education, and community college practitioners, professionals, and leaders.

COUN 820. Counselor Education Teaching and Practice. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: three or more seminars presented by campus Instructional Support Services to include Blackboard Development of Syllabi, Televised Instruction and Classroom Assessment. This course prepares students to teach counseling and related courses. Topics covered are learning theories, retention of material, motivation, classroom instructional strategies and techniques, and assessment of learning from the core learning expectations. Students will teach a semester course under supervision of the instructor.

COUN 835. Advanced Counseling Research and Program Evaluation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: ELS 832, 833, and ECI 890. 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.

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.
Lecture 3 hours; 3 credits. Prerequisites: ELS 832, 833, and ECI 890. 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.

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.
Lecture, 3 hours; 3 credits. Prerequisite: Admission to the Counseling Graduate Program or graduate program director approval. 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.

COUN 866. Practicum in College Counseling Leadership. 3 Credits.
3 credits. Supervised practicum in a community college, four-year college, or university counseling unit. Participate in unit management and leadership activities. Maximum 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. 3-12 Credits.
3-12 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.
COUN 869. Advanced Supervised Practicum in Counseling. 3 Credits. 3 credits. Prerequisites: COUN 801, 820, 742/842, 744/844. 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.

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 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. Lecture 3 hours; 3 credits. Prerequisites: COUN 801, ELS 832, 833, ECI 890, COUN 820, 835, 742/842, 744/844, 846, 869, and at least one specialty course. A seminar 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. Lecture 3 hours; 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. Lecture 3 hours; 3 credits. To familiarize students with the policy process as it relates to crime legislation, criminological theory and implications for public policy.

CRIM 702. Advanced Criminological Theory. 3 Credits. Lecture 3 hours; 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. Lecture 3 hours; 3 credits. To examine 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 795. Topics in Criminal Justice. 1-3 Credits.

CRIM 797. Independent Study. 1-3 Credits.

CRIM 800. Proseminar in Criminology and Criminal Justice. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. To examine 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 805. Multivariate Statistics in Criminological Research. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. This course explores advances 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 820. Advanced Research Methods in Criminology & Criminal Justice. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. This course examines the links between social structures and institutions, and justice at the individual, neighborhood, city, state and country levels. We will 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.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. This course explores crimes of states 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 855. Researching the Criminal Justice System. 3 Credits.
Lecture 3 hours, 3 credits. Students will develop original research projects focusing on the criminal justice system, police, courts and/or corrections. Projects will be designed to culminate in a publishable paper.

CRIM 860. Life Course Criminology. 3 Credits.
Lecture 3 hours; 3 credits. This course is designed to introduce graduate students to life-course perspectives for understanding crime and deviant behavior. We will discuss the various methodologies, both quantitative and qualitative, most commonly found in studies of the life course today.

CRIM 890. Dissertation Research Seminar. 3 Credits.
Lecture 3 hours; 3 credits. This course facilitates students in developing a dissertation proposal for research in criminology and criminal justice.

CRIM 895. Topics in Criminal Justice. 1-3 Credits.
CRIM 897. Independent Study. 1-3 Credits.
CRIM 899. Dissertation. 1-9 Credits.
CRIM 999. Criminology 999. 1 Credit.

CRJS - Criminal Justice

CRIMINAL JUSTICE Courses

CRJS 620. Criminological Theory. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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. (cross-listed with SOC 627).
CRJS 650. Research Seminar. 3 Credits.
3 credits. Prerequisites: SOC 610 or CRJS 610, SOC 620 or CRJS 620, SOC 630 or CRJS 630, and SOC 640 or CRJS 640. 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. (cross-listed with SOC 650).

CRJS 661. Policing. 3 Credits.
Lecture 3 hours; 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.

CRJS 662. Criminal Justice and the Law. 3 Credits.
Lecture 3 hours; 3 credits. A study of law and its interpretation as it affects the criminal justice system. Includes such issues as the substance of criminal law and the criminal court setting as a social system.

CRJS 663. Corrections. 3 Credits.
Lecture 3 hours; 3 credits. A study of society’s response to crime through its use of institutional and noninstitutional corrections. Topics include inmate culture, correction officer behavior and community corrections programs.

CRJS 668. Internship. 3 Credits.
3 credits. Prerequisite: permission of the instructor. 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.

CRJS 695. Topics in Criminal Justice. 3 Credits.
Lecture 3 hours; 3 credits. Advanced seminars on selected topics in criminal justice. Topics will vary by semester.

CRJS 696. Topics in Criminal Justice. 3 Credits.
Lecture 3 hours; 3 credits. Advanced seminars on selected topics in criminal justice. Topics will vary by semester.

CRJS 697. Independent Study in Special Topics in Criminal Justice. 3 Credits.
3 credits. Prerequisite: approval of the department chair. Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

CRJS 698. Independent Study in Special Topics in Criminal Justice. 3 Credits.
3 credits. Prerequisite: approval of the department chair. Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

CRJS 699. Thesis. 3-9 Credits.
3-9 credits.

CS - Computer Science

COMPUTER SCIENCE Courses

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 716. Bioinformatics I. 3 Credits.
Lecture 3 hours; 3 credits. Fundamental topics in bioinformatics: introduction to molecular biology, pair-wise 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, pair-wise 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 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 techniques 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 816. Bioinformatics I, 3 Credits.
Lecture 3 hours; 3 credits. Fundamental topics in bioinformatics; introduction to molecular biology, pair-wise 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 844. Performance Evaluation of Computer Systems and Networks, 3 Credits.
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CS 875. 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.

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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.

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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 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 650. 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 651. 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.
DANC - Dance

DANCE Courses

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

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

DNTH - Dental Hygiene

DENTAL HYGIENE Courses

DNTH 604. Clinical Administration and Teaching. 4 Credits.
Seminar 3 hours; clinical teaching practicum 2 hours; 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.
Lecture. 3 hours; 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.
3-9 credits. Prerequisite: DNTH 514. 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.

DNTH 660. Educational Concepts for the Health Professional II. 3 Credits.
Seminar 3 hour; 3 credits. Prerequisite: DNTH 514 or by permission of the instructor. 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).

DNTH 668. Internship. 3-9 Credits.
3, 6, or 9 credits. Prerequisites: DNTH 514, DNTH 515 and permission of the instructor. 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).

DNTH 695. Topics in Dental Hygiene. 1-6 Credits.
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.
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.
3 credits. Prerequisite: DNTH 515. 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).

DNTH 699. Thesis. 3 Credits.
3 credits. Prerequisite: DNTH 698. 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).

ECE - Elect Computer Engineering
ELECT COMPUTER ENGINEERING Courses

ECE 601. Linear Systems, 3 Credits.
Lecture 3 hours; 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.

ECE 605. Engineering Systems Modeling, 3 Credits.
Lecture 3 hours; 3 credits. The goal of this course is to develop understanding of the various modeling paradigms appropriate for conducting digital computer simulation of many types of systems. The techniques and concepts discussed typically include concept graphs, Bayesian nets, Markov models, Petri nets, system dynamics, Bond graphs, cellular automata, L-systems, and parallel and distributed simulation systems. Students will report on a particular technique and team to implement a chosen system model. (cross listed with MSIM 605).

ECE 606. Visualization I, 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Linear Algebra, C and C++ programming, and calculus. 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.
Lecture 3 hours; 3 credits. Prerequisite: Graduate Standing. 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.

ECE 611. Numerical Methods in Engineering Analysis, 3 Credits.
Lecture, 3 hours; 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.
3 cr. Lecture, 3 hours. Prerequisite: ECE 200, 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.
Lecture 3 hours; 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.

ECE 642. Computer Networking, 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: permission of the instructor. 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.

ECE 643. Computer Architecture Design, 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECE 543. 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.

ECE 648. Advanced Digital Design, 3 Credits.
Lecture 3 hours; 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.

ECE 651. Statistical Analysis and Simulation, 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: one undergraduate course in probability or statistics. An introduction to probabilistic and statistical techniques for analysis of signals and systems. This includes a review of probability spaces, random variables, and random processes. Analysis and simulation of systems with random parameters and stochastic inputs are considered.

ECE 652. Wireless Communications Networks, 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: ECE 551 or permission of instructor. Fundamental concepts in wireless communication systems and networks: radio waveform propagation modeling (free-space, reflections and multipath, fading, diffraction and Doppler effects); physical and statistical models for wireless channels; modulation schemes for wireless communications and bandwidth considerations; diversity techniques; MIMO systems and space-time coding; multiuser systems and multiple access techniques (TDMA, FDMA, CDMA); spread spectrum and multiuser detection; introduction to wireless networking and wireless standards; current and emerging wireless technologies.

ECE 667. Cooperative Education, 1-3 Credits.
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/Career Management program prior to the semester in which the work experience is to take place.

ECE 668. Internship, 1-3 Credits.
1-3 credits. Prerequisite: approval by department and Career Management. 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. Meant to be used for one-time experience. Work may or may not be paid. Project is completed during the term.

ECE 669. Practicum, 1-3 Credits.
1-3 credits. Prerequisite: approval by department and Career Management. 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.

ECE 695. Topics in Electrical or Computer Engineering, 3 Credits.
Lecture 3 hours; 3 credits. This course will be offered as needed, depending upon the need to introduce special subjects to target specific areas of master’s-level specializations in electrical or computer engineering.

ECE 696. Topics in Fuzzy Logic, 3 Credits.

ECE 697. Independent Study, 3 Credits.

ECE 698. Master’s Project, 1-3 Credits.
3 credits. Individual project directed by the student’s professor in major area of study.
ECE 699. Thesis. 1-9 Credits.
1-9 credits. Prerequisite: departmental approval. Directed research for the master’s thesis.

ECE 731. Graduate Seminar. 1 Credit.
Lecture 1 hour; 1 credit. Graduate seminar presentations concerning technical topics of current interest given by faculty and invited speakers.

ECE 742. Computer Communication Networks. 3 Credits.
Lecture 3 hours; 3 credits. 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.

ECE 751. Biostatistics: Fundamentals and Applications. 3 Credits.
Lecture, 3 hours. 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.

ECE 762. Digital Control Systems. 3 Credits.
Lecture 3 hours; 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.

ECE 763. Multivariable Control Systems. 3 Credits.
Lecture 3 hours; 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.

ECE 766. Nonlinear Control Systems. 3 Credits.
Lecture 3 hours; 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.

ECE 773. Introduction to Nanotechnologies. 3 Credits.
Lecture 3 hours; 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 nanostructures, (3) characterization and properties of nanomaterials, and (4) application of nanoscale devices.

ECE 774. Semiconductor Characterization. 3 Credits.
Lecture 3 hours; 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.

ECE 775. Non-thermal Plasma Engineering. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.

ECE 780. Machine Learning II. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: 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.
Lecture 3 hours; 3 credits. Prerequisites: ECE 782/882. 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.

ECE 784. Computer Vision. 3 Credits.
Lecture, 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: permission of the instructor. 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.

ECE 795. Topics in Electrical and Computer Engineering. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: departmental approval.

ECE 796. Topics in Electrical and Computer Engineering. 3 Credits.

ECE 797. Independent Study. 3 Credits.
3 credits. Prerequisite: permission of the department. This course allows students to develop specialized expertise by independent study (supervised by a faculty).

ECE 831. Graduate Seminar. 1 Credit.
Lecture 1 hour; 1 credit. Graduate seminar presentations concerning technical topics of current interest given by faculty and invited speakers.
ECE 842. Computer Communication Networks. 3 Credits.
Lecture 3 hours; 3 credits. 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.

ECE 851. Biostatistics: Fundamentals and Applications. 3 Credits.
Lecture, 3 hours. 3 credits. Prerequisite: 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, 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 862. Digital Control Systems. 3 Credits.
Lecture 3 hours; 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.

ECE 863. Multivariable Control Systems. 3 Credits.
Lecture 3 hours; 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.

ECE 880. Machine Learning II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: 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 885. Electrical and Computer Engineering 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 degree is complete.

ECE 896. Topics in Electrical and Computer Engineering. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: departmental approval. Directed research for the doctoral dissertation.

ECON - Economics
ECONOMICS Courses

ECON 604. Managerial Economics and International Trade. 3 Credits.
Lecture 3 hours; 3 credits. (Credit may not be applied toward the M.A. in Economics) Corequisite: BNAL 600 or URBN 606. 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.

ECON 612. Global and Applied Macroeconomics. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECON 604. (Credit may not be applied toward the M.A. in economics) 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.

ECON 625. Mathematical Economics. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECON 604; ECON 612; or ECON 650. 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.

ECON 650. International Economics. 3 Credits.
Lecture and discussion 3 hours; 3 credits. (Credit may not be applied toward the M.A. in economics.) 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.

ECON 668. Economics Internship. 3 Credits.
3 credits. Prerequisites: 12 hours of economics and permission of the graduate program director. The course is a practicum in the field of economics applying theories, concepts, and quantitative tools in a professional environment.

ECON 695. Selected Topics in Economics. 1-3 Credits.
1-3 credits. For school teachers only. Credit may not be applied toward the M.A. in economics or the M.B.A.

ECON 696. Selected Topics in Economics. 1-3 Credits.

ECON 697. Readings in Economics. 3 Credits.
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.
3 credits. Individual research under the direction of a faculty member of the department.

ECON 699. Thesis. 6 Credits.
6 credits.

ECON 701. Advanced Economic Analysis: Microeconomics. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: ECON 625. Prerequisite: ECON 604 or equivalent. 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.

ECON 703. Advanced Economic Analysis: Macroeconomics. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: ECON 625. Prerequisite: ECON 612 or equivalent. Study of income, employment, the price level, money, and the effect of government policy under static and dynamic conditions. Mainstream and alternative theories considered.

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

ECON 707. Econometrics II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECON 706/806. 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.

ECON 708. Econometrics III. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECON 707/807. 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.

ECON 752. International Trade. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECON 604 or 650 or equivalent. 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.

ECON 753. International Finance. 3 Credits.

ECON 754. Economic Development. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECON 604 or 650. 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.

ECON 795. Selected Topics in Economics. 1-3 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 economics.

ECON 801. Advanced Economic Analysis: Microeconomics. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: ECON 625. Prerequisite: ECON 604 or equivalent. 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.

ECON 803. Advanced Economic Analysis: Macroeconomics. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: ECON 625. Prerequisite: ECON 612 or equivalent. Study of income, employment, the price level, money, and the effect of government policy under static and dynamic conditions. Mainstream and alternative theories considered.

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

ECON 807. Econometrics II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECON 706/806. 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.
ECON 808. Econometrics III. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECON 707/807. 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.

ECON 852. International Trade. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECON 604 or 650 or equivalent. 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.

ECON 853. International Finance. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECON 612 or 650 or equivalent. 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.

ECON 854. Economic Development. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECON 604 or 650. 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.

ECON 895. Selected Topics in Economics. 1-3 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 economics.

ECON 999. Economics 999. 1 Credit.

ELS - Educ Leadership Services

EDUC LEADERSHIP SERVICES Courses

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. Prerequisite: 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. Prerequisite: 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 600, 610, and 621. 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. Prerequisite: 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. Prerequisites: ELS 600, 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, 610, 621, 626, and 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 753. Public School Finance. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: ELS 600 and 610. This course includes the study of the way today’s public schools are financed, including an analysis of the sources of revenues, the distribution of revenue, and the budgeting and expenditure of revenue. 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, and purchasing procedures. Students will learn how investment in education develops human capital.

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. 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 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 778. 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 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 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 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. Public School Finance. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: ELS 600 and 610. This course includes the study of the way today’s public schools are financed, including an analysis of the sources of revenues, the distribution of revenue, and the budgeting and expenditure of revenue. 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, and purchasing procedures. Students will learn how investment in education develops human capital.

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.

ELS 864. 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 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 education can play 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.
Lecture 3 hours; 3 credits. Prerequisite: admission to the Ph.D. program. This course examines social justice issues related to the curriculum leadership aspect of America’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 895. Topics in Educational Leadership. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

ELS 896. Topics in Urban Educational Leadership. 1-3 Credits.
1-3 credits. Prerequisite: master’s degree and permission of the instructor.

ELS 897. Topics in Educational Leadership. 1-3 Credits.
ELS 899. 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 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 group 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.
Lecture 3 hours; 3 credits. Prerequisites: Admission to the MFA program and permission of the instructor. 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.
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.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. A detailed study of the techniques of fiction and nonfiction with some emphasis given to the various theories informing the genre.

ENGL 661. Craft of Poetry. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate standing. A detailed study of the techniques of poetry with some emphasis on the various theories informing the genre.

ENGL 662. Cybertutues 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 666. Graduate Internship and Project in Professional Writing. 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.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: ENGL 540 or permission of the instructor. 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.

ENGL 672. Syntax. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ENGL 540 or permission of the instructor. An examination of the syntactic structures, morphology, and semantics of natural languages, with emphasis on English. Practice in syntactic analysis and formal description. Comparison of current syntactic and semantic theories.

ENGL 673. Discourse Analysis. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ENGL 540 or permission of the instructor. A survey of various concepts and issues related to analyzing the structure of spoken and written discourse in English: the intonation unit, the verbalization of given and new information, conversational analysis, textual cohesion, speech act theory, and scripts and schemes in narratives.

ENGL 674. Internship in Applied Linguistics. 3 Credits.
3 credits. Prerequisite: 12 graduate credits in linguistics. A structured work experience involving teaching or work in applied linguistics in a professional setting. To be documented by a portfolio of written work.

ENGL 675. Practicum in TESOL. 3 Credits.
3 credits. Prerequisites: ENGL 670 and permission of the instructor. 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.

ENGL 676. Semantics. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ENGL 540 or permission of the instructor. An advanced survey of meaning in language. Consideration of how best to characterize linguistic meaning, relationships between meaning, culture, and cognition (categorization, metaphor), word and sentence meaning, and interpretation of meaning in context (pragmatics, indexicality).

ENGL 677. Language and Communication Across Cultures. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: any upper-division linguistics course or permission of instructor. 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.

ENGL 679. First and Second Language Acquisition. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Students will engage in many of the theoretical debates about teaching L2 writers, as well as practical responses to these debates. With this knowledge students will be prepared to enter the debate, teach L2 writers, and so research on L2 writers and writing.
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 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.
Lecture 3 hours; 3 credits. Study and discussion of recent research in and new materials for the teaching of English. May be repeated for credit when topic varies.

ENGL 694. Thesis Colloquium. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: can be taken after 24 graduate hours have been completed. 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 preatory essay required for their defense.

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) of 20) 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.
Lecture 3 hours; 3 credits. Prerequisite: admission into the Applied Linguistics M.A. or the Ph.D. in English. The course is an introduction to cultural linguistics and to theories underlying some of the major strands of empirical and philosophical studies of language: structuralism, generative grammar, speech acts, cognitive linguistics, discourse, narrative, semantics, pragmatics, metaphor, and translation.

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/for 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: 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 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 748. Categorical Methods for Social and Behavioral Sciences. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisites: PSYC 727/827 or 827/828. 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.

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.
Lecture 3 hours; 3 credits. Prerequisite: ENGL 705 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.
Lecture 3 hours; 3 credits. Prerequisite: 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 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 778. Seminar in Sociolinguistics. 3 Credits.
Lecture 3 hours; 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. Graduate Seminar in English. 3 Credits.
Lecture 3 hours; 3 credits. Intensive seminar in a variable literary or literary-cultural topic.

ENGL 792. Graduate Seminar in English. 3 Credits.

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.
Lecture 3 hours; 3 credits. Prerequisite: admission into the Applied Linguistics M.A. or the Ph.D. in English. The course is an introduction to cultural linguistics and to theories underlying some of the major strands of empirical and philosophical studies of language: structuralism, generative grammar, speech acts, cognitive linguistics, discourse, narrative, semantics, pragmatics, metaphor, and translation.
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.

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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.

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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.

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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.

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Lecture 3 hours; 3 credits. 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.

ENGL 850. Service Learning in English Studies. 3 Credits.
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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.

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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.
Lecture 3 hours; 3 credits. Prerequisite: ENG 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.

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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.

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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.
Lecture 3 hours; 3 credits. Prerequisite: 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 878. Seminar in Sociolinguistics. 3 Credits.
Lecture 3 hours; 3 credits. This survey course investigates socially meaningful language variation. Topics include: social variation, language ideologies, language and authority, and style.

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. Graduate Seminar in Literary Studies. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Student must be enrolled in doctoral program to take this course. Intensive seminar in variable literacy or literary-cultural topic.

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 602T. Engineering for Secondary School Teachers. 1-3 Credits.
Lecture 1 to 3 hours; 1 to 3 credits. Prerequisite: Bachelor’s degree or permission of the instructor. 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.

ENGN 603T. Engineering Seminar for Teachers. 1-3 Credits.
Lecture 1 to 3 hours; 1 to 3 credits. Prerequisite: Bachelor’s degree or permission of the instructor. An introductory seminar on specific multidisciplinary or interdisciplinary engineering topics for MS or HS teachers.

ENGN 611. Financial Engineering. 3 Credits.
Lecture 3 hours; 3 credits. Financial engineering management, accounting, financial reports and analysis, capital budgeting, investment decisions.

ENGN 612. Engineering Corporate Management. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: bachelor’s degree in physics, engineering or biology. 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).

ENGN 671. Carbon-Free Clean Energy. 3 Credits.
Lecture. 3 hours; 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.
Lecture. 3 hours; 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.
ENMA 673. Fossil Energy. 3 Credits.
Lecture, 3 hours; 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.

ENMA 695. Multidisciplinary Topics in Engineering. 1-3 Credits.
1-3 credits. Special interdisciplinary or multidisciplinary topics of interest with emphasis on emerging areas in engineering.

ENMA 811. Methodologies for Advanced Engineering Projects. 3 Credits.
Lecture 3 hours; 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.

ENMA 812. Engineering Leadership. 3 Credits.
Lecture 3 hours; 3 credits. Effective communication techniques, strategic planning, building collaborative relationships, conflict management, building high-performance teams, risk management, managing innovations.

ENMA 813. Engineering Ethics. 3 Credits.
Lecture 3 hours; 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 600. Cost Estimating and Financial Analysis. 3 Credits.
Lecture 3 hours; 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.

ENMA 601. Analysis of Organizational Systems. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 1 hour; 1 credit. Prerequisites: completion of minimum of 18 credit hours in program of study. 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.

ENMA 606. Engineering Law. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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. Prerequisite: ENMA 603. 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.

ENMA 614. Quality Systems Design. 3 Credits.
Lecture 3 hours; 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.

ENMA 616. The Entrepreneurial Engineering Manager. 3 Credits.
Lecture 3 hours; 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 not exempt from 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
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.
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.
1-3 credits. Prerequisite: approval by department and Career Management. 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.

ENMA 690. Preparation Seminar for Systems Engineering Certification. 1 Credit.

ENMA 695. Topics in Engineering Management. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits. Prerequisite: permission of the instructor. Special topics of interest with emphasis placed on recent developments in engineering management.

ENMA 696. Topics in Engineering Management. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits. Prerequisite: permission of the instructor. Special topics of interest with emphasis placed on recent developments in engineering management.

ENMA 697. Independent Study in Engineering Management. 3 Credits.
3 credits. Prerequisite: permission of graduate program director. Individual study selected by the student. Supervised and approved by a faculty member with the approval of the graduate program director.

ENMA 698. Master’s Project. 1-3 Credits.

ENMA 699. Thesis. 1-6 Credits.
1-6 credits. Prerequisite: ENMA 721 and permission of the graduate program director. Research leading to a Master of Science thesis.

ENMA 700. Economic Analysis of Capital Projects. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: This course is an advanced treatment of economic analysis. 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.

ENMA 702. Methods for Rational Decision Making. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.

ENMA 711. Methodology for Advanced Engineering Projects. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. This graduate 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours. 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 420/520 or equivalent) is assumed. Research paper required.

ENMA 723. Enterprise and Complex System Dynamics. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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 725. System Theory and Cybernetics II. 3 Credits.

ENMA 727. Engineering Management and Technology. 3 Credits.

ENMA 735. Team Performance and Decision Making in Engineering. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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. Knowledge of probability and statistics (ENMA 420/520 or equivalent) is assumed.

ENMA 750. System of Systems Engineering. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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 420/520 or equivalent) is assumed. Case studies. Semester project.

ENMA 771. Risk and Vulnerability Management of Complex Interdependent Systems. 3 Credits.
Seminar discussions and team projects; 3 credits. Prerequisite: permission of the instructor. 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.
Lecture 3 hours; 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.
Seminar discussions and team projects; 3 credits. Prerequisite: ENMA 601 or Ph.D. Standing. 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.
Lecture 3 hours; 3 credits. Special topics of interest with emphasis placed on recent developments in engineering management.

ENMA 796. Topics in Cybernetics. 1-3 Credits.
Lecture 3 hours; 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.
1-3 credits. Prerequisite: permission of the instructor and graduate program director. 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.

ENMA 800. Economic Analysis of Capital Projects. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: This course is an advanced treatment of economic analysis. 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.

ENMA 802. Methods for Rational Decision Making. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.

ENMA 811. Methodology for Advanced Engineering Projects. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. This graduate 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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 818. Foundations of Research. 3 Credits.
Lecture 3 hours. 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 420/520 or equivalent) is assumed. Research paper required.

ENMA 823. Enterprise and Complex System Dynamics. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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 825. System Theory and Cybernetics II. 3 Credits.

ENMA 835. Team Performance and Decision Making in Engineering. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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. Knowledge of probability and statistics (ENMA 420/520 or equivalent) is assumed.

ENMA 850. System of Systems Engineering. 3 Credits.
Lecture 3 hours; 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 851. Complexity, Engineering and Management. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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 420/520 or equivalent) is assumed. Case studies. Semester project.
ENMA 871. Risk and Vulnerability Management of Complex Interdependent Systems. 3 Credits.
Seminar discussions and team projects; 3 credits. Prerequisite: permission of the instructor. 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.
Lecture 3 hours; 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; 3 credits. Prerequisite: ENMA 601 or Ph.D. Standing. 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 888. Ph.D. Seminar. 1 Credit.
2 hours per week; 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.
1-12 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.
Lecture 3 hours; 3 credits. Special topics of interest with emphasis placed on recent developments in engineering management.

ENMA 896. Topics in Cybernetics. 1-3 Credits.
Lecture 3 hours; 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.
1-3 credits. Prerequisite: permission of the instructor and graduate program director. 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.

ENMA 898. Research in Engineering Management. 1-12 Credits.
1-12 credits. Prerequisites: ENMA 821 and permission of graduate program director. Supervised research prior to passing Ph.D. candidacy exam.

ENMA 899. Doctoral Research. 1-12 Credits.
1-9 credits. Prerequisites: ENMA 821 and permission of instructor.

ENMA 999. Engineering Management 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.

ENVH - Environmental Health

ENVIRONMENTAL HEALTH Courses

ENVH 600. Principles of Environmental Health Science and Protection. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisites: MPH 610, 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.
Lecture 3 hours; 3 credits. Collection methods, analysis and interpretation of epidemiologic data with environmental and occupational disease emphasis.

ENVH 610. Food Microbiology. 4 Credits.
Lecture 3 hours; laboratory 3 hours; 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.
Lecture 3 hours; laboratory 3 hours; 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.
Lecture 3 hours; laboratory 3 hours; 4 credits. Prerequisite: ENVH 543. 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.

ENVH 643. Principles of Toxicology. 3 Credits.
Lecture 3 hours; 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.

ENVH 722. Control of Hazards in the Workplace. 3 Credits.
Lecture 3 hours; 3 credits. Advanced methods for evaluation and control of hazards in the workplace.

ENVH 795. Selected Topics in Environmental Health. 1-3 Credits.
Lecture 1-3 hours; 1-3 credits each semester. Prerequisite: permission of the instructor.
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 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 successfully 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 697. Selected Topics in Finance. 1-3 Credits.
1-3 hours; 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 698. 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 a finance 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 735. Portfolio Analysis. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: FIN 605. 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.

FIN 737. 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 transfer of goods and services and decision making in connection with the asset management financing activities of multinational corporations.

FIN 740. 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.
Lecture and discussion 3 hours; 3 credits. Prerequisite: FIN 605. 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.

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 transfer 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.

GER - German

GERMAN Courses
GER 695. Topics in German. 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 a supplement distributed to graduate program directors.

GER 696. Topics in German. 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 a supplement distributed to graduate program directors.

GER 697. Tutorial Work in German. 3 Credits.
3 credits. Prerequisites: approval of project. This course will allow an individual student to pursue a special topic or project under the guidance of a professor.

GER 698. Tutorial Work in German. 3 Credits.
3 credits. Prerequisites: approval of project. This course will allow an individual student to pursue a special topic or project under the guidance of a professor.

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 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 covers 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 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 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 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 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. 1-3 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 transition to professional student affairs roles.

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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. 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.

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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.

HIED 866. 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 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 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.

HIED 893. 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 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.
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 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. 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 695. Topics in History. 1-3 Credits.
1-3 credits.

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 703. Targeted Therapeutics. 3 Credits.
Lecture, 3 hours; 3 credits. This course examines the practical design of nucleic acid, protein, or drug therapies and the mechanisms by which these therapies may be targeted to particular macromolecules, cells, or tissues. Content includes the potential applications of these target therapies and regulatory hurdles in bringing new therapies to human trials.

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.

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 Public Health. 3 Credits.

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 803. Targeted Therapeutics. 3 Credits.
Lecture, 3 hours; 3 credits. This course examines the practical design of nucleic acid, protein, or drug therapies and the mechanisms by which these therapies may be targeted to particular macromolecules, cells, or tissues. Content includes the potential applications of these target therapies and regulatory hurdles in bringing new therapies to human trials.

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.

HLSC 809. MULTIDISC APPRCH HLTH SVC RSCH. 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. Health-Care Research Methodologies I. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite or corequisite: HLSC 710/810. This course is 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. Instrumentation in the Health Sciences. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate-level courses in research design and statistics or permission of the instructor. 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 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.
Lecture 3 hours; 3 credits. This course enables the student to develop a systematic and analytical frameworks 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 grantsmanship, 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.
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 the health services.

HLSC 898. Supervised Research. 1-3 Credits.
3 credits. Supervised research on a specialized topic. Can be repeated up to 4 times.
disciplinary boundaries. Approaches, and visual studies, as well as the conduct of research across critical/cultural studies, historical methods, qualitative social scientific humanistic disciplines. Students will become familiar with literary theory, HUM 602. Theory and Methods in Humanities. 3 Credits.

by engaging with some of the great works of social theory from the twentieth communication, and mediation. Students address these questions and ideas history. These include questions of culture, reality, society, power, truth, 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.

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.

Permission of Humanities director required. Pass/fail grading only. HUM 696. Special Topics in Humanities. 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 the Humanities. 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.

1-3 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.

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.

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.

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.

Lecture 3 hours; 3 credits. This class instructs students in various theoretical and methodological approaches for conducting research within the humanistic 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 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.

Lecture 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.

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.

Lecture 3 hours; 3 credits. Prerequisites: HUM 601 and 602.

Lecture 3 hours; 3 credits. Course requirement for thesis option.

Lecture 3 hours; 3 credits. Independent reading and study under the direction of an instructor on a topic to be selected.

Lecture 3 hours; 3 credits. Independent reading and study under the direction of an instructor on a topic to be selected.

HUM 699. Humanities 999. 1 Credit.

HPE 698. Thesis. 3 Credits.
HPE 699. Thesis. 3 Credits.

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 752. 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 755. 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 756. 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 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.

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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.

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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 techniques 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.
Lecture 3 hours. 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. 1-9 Credits.
3 credits. Independent research on a topic from an interdisciplinary perspective. Students must receive prior approval from the faculty supervisor and the director. May be repeated up to six credits.

IS 698. Directed Research. 1-9 Credits.
3 credits. Prerequisite: approval of director or instructor. Methodological and theoretical preparation designed to assist students in writing a thesis.

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 environ-ment, 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 Cold War 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. 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.

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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.

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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.

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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.
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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 819. 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 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.

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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?

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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.

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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.

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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.

IS 848. 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 851. 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 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.
Lecture and discussion 3 hours; 3 credits. Prerequisites: IT 610 or IT 612. Knowledge Management. 3 Credits. Organizational and technological challenges involved on managing organizations. This course prepares students for the managerial, 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 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 XQery, 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. 1-3 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.
LIBS - Library Science

LIBRARY SCIENCE Courses

LIBS 602. Production of Instructional Materials. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: graduate standing, LIBS 675. 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.
Lecture, 3 hours; 3 credits. 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. 1-9 Credits.
50 hours; 3 or 9 credits. Prerequisite: LIBS 602,605, 675, 676, 678, 679. 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. They will take LIS 693 for 3 or 9 credits.

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 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.

LIBS 678. Selection, Evaluation and Utilization of Materials NK-12. 4 Credits.
Lecture 4 hours; 4 credits. Prerequisites: graduate standing, LIBS 642, 675. Emphasis is on reading and evaluating current materials for children and young adults, researching reading/viewing/ listening preferences, analyzing studies dealing with literature/media, and selecting materials. Also includes collection analysis and development.

LIBS 679. Theory and Management of Reference and Information Retrieval. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: graduate standing and LIBS 675. Students evaluate, select, and use reference sources; explore strategies for teaching reference skills across the curriculum; use curriculum information to evaluate reference collections and prepare bibliographies; and explore issues related to reference services. Utilizes print as well as existing and emerging technologies.

MAE - Mechanical/Aerospace Engr

MECHANICAL/AEROSPACE ENGR Courses

MAE 601. Engineering Mathematics. 3 Credits.
Lecture, 3 hours; 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.
Lecture, 3 hours; 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.
Lecture, 3 hours; 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.
Lecture, 3 hours; 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.
Lecture, 3 hours; 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.
Lecture, 3 hours; 3 credits. CO-requisites: MATH 691 or MAE 601. 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 2 hours; lab, 2 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisite: permission of the instructor. Comprehensive examination of aerodynamic test facilities for use in subsonic, transonic, supersonic and hypersonic flow regimes. Aspects of wind tunnel design and operation. Flow quality. Wall and support interferences. Advanced concepts including cryogenic wind tunnels, adaptive wall test sections and magnetic suspension. Dynamic testing. Review of flight test methods, including extraction of aerodynamic parameters from flight test data. Review of engine test facilities. Review of ground test facilities for space structures and other space systems.

MAE 620. Heat Transfer I. 3 Credits.
Lecture, 3 hours; 3 credits. Co-requisite: MAE 605; Pre-requisite: MAE 602. 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 621. Experimental Aerodynamics. 3 Credits.

MAE 622. Theory and Design of Turbomachines. 3 Credits.
Lecture, 3 hours; 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.
Lecture, 3 hours; 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Provides an understanding of the finite element method (FEM) as derived from an integral formulation perspective. Demonstrates the solutions of (1-D and 2-D) continuum mechanics problems such as solid mechanics, fluid mechanics and heat transfer. Provides insight into the theoretical formulation and numerical implementation of finite element methods.

MAE 631. Experimental Structural Dynamics. 3 Credits.
Lecture, 1 hour; Lab, 4 hours; 3 credits. Prerequisite: 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 632. Theory of Vibrations. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: MAE 601 or MATH 691. Aircraft loads estimation. Review of basic elasticity. Stress functions, Prandtl stress function, St. Venant warping, membrane analogy. Bending, shear, and torsion of open and closed, thin-walled cross sections. Analysis of tapered beams with application to fuselages and wings, cutouts, end constraints. Introduction to composite materials.

MAE 640. Modern Control Theory. 3 Credits.

MAE 641. Aerospace Vehicle Performance. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: MAE 602 and MAE 514 or 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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 gyros. 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.
Lecture, 3 hours; 3 credits. Prerequisite: permission of the instructor. Reinforcements, 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 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.
Internship, 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.

MAE 669. Practicum in Mechanical and Aerospace Engineering, 1-3 Credits.
Practicum, 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. Student is usually already employed--this is an additional project within the organization.

MAE 670. Computational Methods in Mechanical and Aerospace Engineering, 3 Credits.
Lecture, 3 hours; 3 credits. Numerical methods for linear algebra eigenvalue problems, curve fitting optimization, differentiation, integration, ordinary and partial differential equations. Applications in mechanical and aerospace engineering.

MAE 672. Design of Experiments, 3 Credits.
Lecture, 2 hours; Lab, 2 hours; 3 credits. Prerequisite: MAE 572. 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.

Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours. 3 credits. Prerequisite: 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.
Lecture, 3 hours. 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.
Seminar, 1 hour; 1 credit. Regular tutorials on recent topics of interest in mechanical and aerospace engineering and engineering mechanics.

MAE 691. Experimental Research Project, 3 Credits.

MAE 695. Topics in Mechanical and Aerospace Engineering, 3 Credits.
Lecture, 3 hours; 3 credits. Special topics of interest with emphasis placed on recent developments in mechanical and aerospace engineering or engineering mechanics.

MAE 696. Experimental Research Project, 3 Credits.
Laboratory, 6 hours; 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.
Independent Study, 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.
1 – 6 credits. Prerequisite: instructor approval required. Thesis research in mechanical and aerospace engineering or engineering mechanics leading to the Master of Science degree.

MAE 710. Transonic Aerodynamics. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisite: MAE 602, 611, and 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 713. Turbulent Flow. 3 Credits.

MAE 714. Aerodynamic Flow Control. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: MAE 602 and 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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 717. Microfluidics. 3 Credits.
Lecture, 3 hours; 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. Electroknoetic 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisites: MAE 602 and 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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 732. Nonlinear Aerospace Structures. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: MAE 633 and 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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 741. Optimal Control Theory. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
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.

MAE 743. Kinematic Synthesis of Mechanisms. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: 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 Chebychev’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.
Lecture, 3 hours; 3 credits. Prerequisites: MAE 403/503 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 745. Space Flight Dynamics and Control. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisites: MAE 604 and 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 design using momentum wheels, and nonlinear phase-plane design using thrusters.

MAE 746. Advanced Control Methodologies. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: 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 750. Nanoscale Mechanical and Structural Properties of Materials. 3 Credits.
Lecture, 3 hours; 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.
Lecture, 3 hours; 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 770. Perturbation Methods in Aerospace Engineering. 3 Credits.
Lecture, 3 hours; 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
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.

MAE 781. Advanced Design. 3 Credits.
Lecture, 3 hours; 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 784. Computer Integrated Manufacturing. 3 Credits.
Lecture, 3 hours; 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. Contemporary Manufacturing Technology. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: MAE 784/884. Treatment of the next generation of manufacturing technology. Topics include manufacturing strategy; trends in manufacturing control; factory simulation; accounting for manufacturing; and issues in manufacturing systems design.

MAE 786. Microfabrication. 3 Credits.
Lecture, 2 hours; Lab, 2 hours; 3 credits. Basic principles and hands-on experience of microfabrication technology. Design, fabrication and test of standard microfluidic components. Plastic-based microstructures using CNC/laser machining process. Photolithography technique to selectively remove parts of a thin film. Soft lithography technique to fabricate PDMS-based microstructures.

MAE 787. Life Cycle Engineering. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours. 3 credits. Selected topics in mechanical and aerospace engineering or engineering mechanics.

MAE 797. Independent Study in Mechanical and Aerospace Engineering. 3 Credits.
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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisite: MAE 602, 611, and 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.
Lecture, 3 hours; 3 credits. Prerequisite: MAE 602 and 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 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. Electrokinetisk 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisites: MAE 602 and 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Prerequisite: MAE 633 and 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 840. Autonomous and Robotic Systems Analysis and Control, 3 Credits.
Lecture, 3 hours; 3 credits. Kinematics, dynamics and control of complex non-linear electro-mechanical systems, particularly robotic manipulators.

MAE 841. Optimal Control Theory, 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
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.

MAE 843. Kinematic Synthesis of Mechanisms, 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: 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 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.
Lecture, 3 hours; 3 credits. Prerequisites: MAE 403/503 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.
Lecture, 3 hours; 3 credits. Prerequisites: MAE 604 and 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 designing using momentum wheels, and nonlinear phase-plane design using thrusters.

MAE 846. Advanced Control Methodologies. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 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 851. Fatigue and Fracture. 3 Credits.
Lecture, 3 hours; 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.
Lecture, 3 hours; 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.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
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.

MAE 881. Advanced Design. 3 Credits.
Lecture, 3 hours; 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.
Lecture, 3 hours; 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. Contemporary Manufacturing Technology. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: MAE 784/884. Treatment of the next generation of manufacturing technology. Topics include manufacturing strategy; trends in manufacturing control; factory simulation; accounting for manufacturing; and issues in manufacturing systems design.

MAE 886. Microfabrication. 2 Credits.
Lecture, 2 hours; Lab, 2 hours; 3 credits. Basic principles and hands-on experience of microfabrication technology. Design, fabrication and test of standard microfluidic components. Plastic-based microstructures using CNC/laser machining process. Photolithography technique to selectively remove parts of a thin film. Soft lithography technique to fabricate PDMS-based microstructures.

MAE 887. Life Cycle Engineering. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: 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.
Lecture, 3 hours; 3 credits. Selected topics in mechanical and aerospace engineering or engineering mechanics.

MAE 897. Independent Study in Mechanical and Aerospace Engineering. 3 Credits.
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.
1 – 9 credits. Prerequisite: 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, use 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

MATH 605. Complex Variables I. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: MATH 501, 518 and 522. An advanced course in complex analysis.

MATH 615. Advanced Calculus for Teachers. 3 Credits.
Lecture 3 hours; recitation 1 hour; 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.

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.
Lecture 3 hours; 3 credits. Prerequisite: MATH 617. 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.

MATH 620. Optimization Techniques. 3 Credits.
Lecture 3 hours; 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.

MATH 622. Numerical Solutions to Differential Equations. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MATH 509. 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.

MATH 632. 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.
Lecture 3 hours; 3 credits. Prerequisites: MATH 517. Topics include metric spaces, bilinear and quadratic forms, tensors, point manifolds, theory of curves, geodesic differentiation, theory of surfaces, curvature of general manifolds, integrability.

MATH 638. Mathematical Theories of Continua. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: MATH 501 and 637. Topics include deformation, motion, stress, conservation laws, and constitutive theories.

MATH 691. Engineering Analysis I. 3 Credits.
Lecture 3 hours; 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 692. Engineering Analysis II. 3 Credits.
Lecture 3 hours; 3 credits. Not available to students with credit in MATH 522. 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 693. Engineering Analysis III. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MATH 501 or 691. Advanced topics in the theory and application of ordinary differential equations, distributions, Green’s functions, classification of partial differential equations, initial-value problems, eigenfunction expansions for boundary-value problems, selected special functions, singular perturbation theory for differential equations.

MATH 695. Seminar in Mathematics. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

MATH 696. Topics in Mathematics. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

MATH 697. Topics in Mathematics. 1-3 Credits.

MATH 698. Research. 3 Credits.

MATH 699. Thesis. 3 Credits.

MATH 702. Integral Equations. 3 Credits.

MATH 705. Numerical Linear Algebra. 3 Credits.
Lecture 3 hours; 3 credits. Topics include orthogonal vectors and matrices, norms, singular value decomposition, QR factorization, Gram-Schmidt orthogonalization, least squares problems, condition numbers, stability of backword substitution, stability of least squares algorithm, reduction to Hessenberg or tridiagonal form, and the QR algorithm.

MATH 719. Advanced Applied Functional Analysis. 3 Credits.

MATH 720. Advanced Applied Functional Analysis. 3 Credits.
3 hours lecture; 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 721. Advanced Applied Numerical Methods I. 3 Credits.
Lecture 3 hours; 3 credits each semester. 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.

MATH 722. Advanced Applied Numerical Methods II. 3 Credits.
Lecture 3 hours; 3 credits each semester. 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.

MATH 725. Computational Fluid Dynamics and Solid Mechanics. 3 Credits.
Lecture 3 hours; 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, constraint dynamic problems, fluid-structure coupling problems, differential-algebraic equations, and others.

MATH 745. Transform Methods. 3 Credits.
Lecture 3 hours; 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.

MATH 750. Calculus of Variations. 3 Credits.
Lecture 3 hours; 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.

MATH 755. Introduction to Kinetic Theory and Mesoscopic Methods for Computational Mechanics I. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: MATH 755/855. 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.
1-3 credits. Prerequisite: permission of the instructor.

MATH 796. Topics in Mathematics. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

MATH 797. Topics in Mathematics. 1-3 Credits.

MATH 801. Asymptotic and Perturbation Methods. 3 Credits.
Lecture 3 hours; 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.
MATH 802. Integral Equations. 3 Credits.

MATH 803. Advanced Applied Mathematics I. 3 Credits.
Lecture 3 hours; 3 credits each semester. Prerequisite: MATH 702. 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.

MATH 804. Advanced Applied Mathematics II. 3 Credits.
Lecture 3 hours; 3 credits each semester. Prerequisite: MATH 702. 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.

MATH 805. Numerical Linear Algebra. 3 Credits.
Lecture 3 hours; 3 credits. Topics include orthogonal vectors and matrices, norms, singular value decomposition, QR factorization, Gram-Schmidt orthogonalization, least squares problems, condition numbers, stability of backword substitution, stability of least squares algorithm, reduction to Hessenberg or tridiagonal form, and the QR algorithm.

MATH 817. Mathematical Analysis III. 3 Credits.

MATH 819. Advanced Applied Functional Analysis. 3 Credits.

MATH 820. Advanced Applied Functional Analysis. 3 Credits.
3 hours lecture; 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 Numerical Methods I. 3 Credits.
Lecture 3 hours; 3 credits each semester. 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.

MATH 822. Advanced Applied Numerical Methods II. 3 Credits.
Lecture 3 hours; 3 credits each semester. 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.

MATH 823. Approximation and Optimization I. 3 Credits.
Lecture 3 hours; 3 credits each semester. Prerequisite: permission of the graduate program director. 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.

MATH 825. Computational Fluid Dynamics and Solid Mechanics. 3 Credits.
Lecture 3 hours; 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, constraint dynamic problems, fluid-structure coupling problems, differential-algebraic equations, and others.

MATH 845. Transform Methods. 3 Credits.
Lecture 3 hours; 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.

MATH 850. Calculus of Variations. 3 Credits.
Lecture 3 hours; 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.

MATH 855. Introduction to Kinetic Theory and Mesoscopic Methods for Computational Mechanics I. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 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.

MBA - Master Of Business Admin
MASTER OF BUSINESS ADMIN Courses

MBA 620. 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 621. 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 622. Business Plan Development. 1 Credit.
Lecture 1 hour; 1 credit. Prerequisite: completion of core MBA courses. 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 623. Essential Business Communication Skills. 1 Credit.
Lecture 1 hour; 1 credit. This course will introduce students to concepts and discussion of major communication issues that occur in the workplace and will help students to develop skills to deal with communication issues. Course skills would include how to listen effectively, understand nonverbal cues, manage conflict, and communicate non-defensively.

MBA 624. Employment Law and Regulation. 1 Credit.
Lecture 1 hour; 1 credit. This course will analyze the impact of employment-related statutes and case holdings on the business environment. Federal laws and guidelines relating to the employment relationship are numerous. This course, however, will focus on those that have the greatest impact on personnel decisions and which have increased risks faced by employers.

MBA 625. Leadership in Organizations. 1 Credit.
Lecture 1 hour; 1 credit. Students will develop a practical understanding of what the best research and documented practical experience have shown to be characteristic of effective leadership behavior in a range of organizational contexts. They will better evaluate their own and other’s leadership in organizational settings.

MBA 627. Corporate Compliance. 1 Credit.
Lecture 1 hour; 1 credit. This course examines 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 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. Intellectual Property and Intellectual Asset Management. 3 Credits.
Lecture 3 hour; 3 credit. Prerequisite: 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 633. 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. The course will provide an overview of the practice of the valuation of closely held companies. It will assume a familiarity with basic accounting and finance theory. The course will be an overview 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.

MBA 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 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.
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 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. This 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 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. 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 would 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 850. 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 851. Advanced Topics in Strategy. 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 885. 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 890. Advanced Topics in Strategy. 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 would 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.
MKTG - Marketing

MARKETING Courses

MKTG 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.

MKTG 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.

MKTG 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.

MKTG 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.

MKTG 630. Ethics and Marketing Decision-Making. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MKTG 603 or permission of instructor. Marketers, 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.

MKTG 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. Prerequisites: 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.
MLRS 703. Principles of Immunology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MLRS 500, 501 or permission of instructor. This course will cover basic concepts of the immune system, including antigens, antibodies, and immune responses. Emphasis will be placed on the role of the immune system in health and disease.

MLRS 704. Advanced Immunology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MLRS 703. This course will cover advanced topics in immunology, including molecular genetics, the regulation of the immune response, and the role of the immune system in the development of cancer.

MLRS 711. Cell Biology. 3 Credits.
Laboratory 4 hours; 3 credits. Prerequisite: MLRS 500, 501 and 600, or permission of instructor. This course will cover the basic concepts of cell biology, including cell structure, metabolism, and communication.

MLRS 712. Molecular Biology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MLRS 500, 501 or permission of instructor. This course will cover the fundamental concepts of molecular biology, including DNA, RNA, and protein synthesis.

MLRS 713. Bioinformatics. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MLRS 500, 501, 600, or permission of instructor. This course will cover the use of computational methods to analyze and interpret biological data.

MLRS 714. Molecular Diagnostics Laboratory. 2,3 Credits.
Laboratory hours 4-6; 2-3 credits. Prerequisite: MLRS 600 or permission of instructor. This course will cover the practical aspects of molecular diagnostic techniques, including PCR, capillary electrophoresis, and microarray technology.

MLRS 814. Molecular Diagnostics Laboratory. 2,3 Credits.
Laboratory hours 4-6; 2-3 credits. Prerequisite: MLRS 714. This laboratory course will provide hands-on experience with molecular diagnostic techniques.

MLRS 895. Topics in Molecular Medicine. 1 Credit.
Lecture 1 hour; 1 credit. This course will cover selected topics in molecular medicine.

MLRS 898. Supervised Research in Molecular Biology and/or Diagnostics. 3-6 Credits.
4 to 8 hours; 3 to 6 credits. Prerequisite: MLRS 600 and 601. This course will provide supervised research opportunities in molecular biology and diagnostics.

MLRS 899. Dissertation Research. 1-12 Credits.
Weekly 4-6 hours; 1-12 credits per semester with permission of 24 credits. Prerequisite: advanced standing in Ph.D. program.

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 permission of 24 credits. Prerequisite: advanced standing in Ph.D. program.

MLRS - Medical Lab/Radiation Sci

MEDICAL LAB/RADIATION SCI Courses

MLRS 600. Advanced Clinical Applications of Molecular Diagnostics. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MLRS 500, 501 or permission of instructor. 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, hematoopathology, infectious diseases, mental retardation and developmental delay. Innovative technologies covered include comparative genomic hybridization, pyrosequencing and bead based assays.

MLRS 601. Advanced Molecular Diagnostics Laboratory. 3 Credits.
Lecture 1 hour, Laboratory 4 hours; 3 credits. Prerequisites: MLRS 500, 501; Co-requisite: MLRS 600 or permission of instructor. Emphasis of this course will be on primer design for PCR, advanced real time PCR, cycle sequencing, capillary electrophoresis (CE) as applied to DNA sequencing, analysis of SNPs (single nucleotide polymorphisms), microsatellite instability, microarray technology and detection of methicillin-resistant bacteria.

MLRS 668. Clinical Laboratory Internship. 3 Credits.
3 weeks full time; 3 credit hours. Prerequisite: MLRS 500, 501, 600, and 601. An optional three-week supervised rotation in a hospital-based molecular diagnostic laboratory or a molecular research laboratory.

MLRS 714. Molecular Diagnostics Laboratory. 2,3 Credits.
Laboratory hours 4-6; 2-3 credits. Prerequisites: MLRS 600 and 601. Instructor Program Director approval required. 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.

MLRS 805. Fundamentals of Cancer Biology. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MLRS 600 and MLRS 601 or equivalents. Instructor approval required. 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.

MLRS 810. Molecular Basis of Health and Disease. 3 Credits.
Lecture, 3 hours. 3 credits. Prerequisite: MLRS 600 and 601. 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.

MLRS 814. Molecular Diagnostics Laboratory. 2,3 Credits.
Laboratory hours 4-6; 2-3 credits. Prerequisite: MLRS 600 and 601. Instructor Program Director approval required. 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.

MLRS 895. Topics in Molecular Medicine. 1 Credit.
Lecture 1 hour; 1 credit. Instructor approval required. Student led presentations of current topics related to molecular medicine.

MLRS 898. Supervised Research in Molecular Biology and/or Diagnostics. 3-6 Credits.
4 to 8 hours; 3 to 6 credits. Prerequisite: MLRS 600 and 601. Instructor approval required. Supervised research in molecular diagnostics or biomedical studies. With approval of program director.

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 practices 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 hours 3; 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 hours 3; 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 hours 3; 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 3 hours; 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 CHP 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. Alcohol and Other Drugs: Implications for Public Health Practice. 3 Credits.
Lecture 3 hours; 3 credits. This course focuses on the effects of 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 610. International Shipping and Supply Chain Management. 3 Credits.
Lecture 3 hours; 3 credits. Examines international freight transportation and its relation to 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.
Lecture 3 hours; 3 credits. Prerequisite: DSCI 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). (cross-listed with DSCI 641).

MSCM 890. Seminar in Business Process and Enterprise Systems. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: IT/DS 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.
MSIM 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 IT 893).

MSIM - Modeling And Simulation

MODELING AND SIMULATION Courses

MSIM 601. Introduction to Modeling and Simulation. 3 Credits.
Lecture 3 hours; 3 credits. First course for modeling and simulation graduate students. Modeling and simulation discipline surveyed at an overview level of detail. Definitions, paradigms, applications, and sub-disciplines are introduced. Orient students to Modeling and Simulation Graduate Program, and provides a general conceptual framework for further modeling and simulation studies.

MSIM 603. Discrete Event Simulation. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: undergraduate course in probability and statistics; computer literacy. An introduction to the fundamentals of discrete event simulation (DES). Topics include discrete event simulation methodology, development of simulation models, simulation verification and validation, and the design of simulation experiments. Important statistical concepts, including selection of input probability distribution and output data analysis are developed and applied. A DES tool will be used to create, simulate and analyze self-defined projects.

MSIM 605. Engineering Systems Modeling. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: differential equations and one course on probability and statistics. An overview of various modeling approaches and methods representing both continuous and discrete event systems. Course addresses topics such as concept graphs, Bayesian nets, Markov models, Petri nets, system dynamics, bond graphs, cellular automata, and L-systems. The Unified Modeling Language is introduced as a means of communicating system descriptions. A student project is required. (Cross listed with ECE 605).

MSIM 607. Machine Learning I. 3 Credits.
Lecture 3 hours; 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 608. Introduction to Game Development. 3 Credits.
Lecture 3 hours; 3 credits. Introduction to Game Development is an introductory course focused on game development theory and practices using Microsoft XNA Game Studio with emphasis on educational game development. Topics covered in this course include game architecture, computer graphics theory, user interaction, audio, high level shading language, animation, physics and artificial intelligence.

MSIM 611. Modeling and Simulation Fundamentals I. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: MATH 102M or MATH 162M or equivalent; CS 101D or equivalent; and graduate standing. Introduction to the discipline of modeling and simulation for students not in engineering or sciences. Topics include: basic terminology and concepts; M&S paradigms including Monte Carlo, continuous, and discreet event simulation; and important concepts from supporting disciplines including probability and statistics, systems modeling, analysis and operations research, and computer visualization.

MSIM 612. Modeling and Simulation Fundamentals II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: MSIM 611. Topics include: concepts from supporting disciplines including human factors and project management; M&S methodologies including modeling approaches, verification and validation, distributed simulation, and interoperability and integration. Overview of M&S applications in engineering, science, education, health science, business, and arts & letters.

MSIM 635. Modeling in Musculoskeletal Biomechanics. 3 Credits.

MSIM 641. Visualization I. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: CS 150 or equivalent. A course examining the theories and techniques of computer graphics and visualization for various modeling and simulation applications. Computer graphics fundamentals, including mathematical foundations, rendering pipeline, geometrical transformations, 3D viewing and projections, lighting and shading, texture mapping, and curves and surfaces are explored. Course covers 3D graphics programming in detail and several commonly used visualization software packages. Specific visualization areas, such as scientific visualization, terrain visualization, and mobile visualization, are also discussed.

MSIM 651. Analysis I. 3 Credits.
Lecture 3 hours; 3 credits. An introduction to mathematical and statistical analysis techniques required for the conduct of modeling and simulation studies. Topics include random number generation, input data modeling, measures of effectiveness, output data analysis, variance reduction techniques, and experimental design. Methods for verification and validation are introduced. Course concepts are applied to real systems and data.

MSIM 660. System Architecture and Modeling. 3 Credits.
Lecture 3 hours; 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 IDEF0, TOGAF, DODAF and OPM. Emphasis on system modeling and enterprise engineering. (Cross listed with ENMA 660).

MSIM 667. Cooperative Education. 1-3 Credits.
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.
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 695. Topics in Modeling and Simulation. 3 Credits.
Lecture 3 hours; 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.
3 credits. Prerequisite: permission of instructor or graduate program director. Individual study selected by the student. Supervised and approved by a faculty member with the approval of the graduate program director.

MSIM 699. Thesis. 1-6 Credits.
1-6 credits. Prerequisite: permission of instructor and graduate program director. Research leading to the Master of Science thesis.
MSIM 702. Methods of Rational Decision Making. 3 Credits.
Lecture 3 hours; 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 702/802).

MSIM 711. Finite Element Analysis. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: 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 720. Foundations for Continuous and Real-Time Simulation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: calculus-based physics and ordinary differential equations. Introduction to the fundamentals of modeling and simulating continuous-state, time-driven systems. Topics include use of physics laws to develop differential equation representation of systems and formulation of input/output and state variable equations for systems. Linearization, numerical integration, and techniques for computer based solutions of differential equations are covered. Application domains include mechanical, rotational, electrical, hydraulic, and thermal systems.

MSIM 722. Cluster Parallel Computing. 3 Credits.
Lecture, 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: MSIM 601 or equivalent. 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 DEVS; interoperability protocols; and computational complexity.

MSIM 742. Visualization II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: 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 752. Analysis II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MSIM 603 or equivalent. This course will expand the student’s capabilities in areas of stochastic analysis and data analysis. Course will include the theoretical underpinnings of stochastic processes commonly encountered in the application of operations research, and it will examine the literature of applied stochastic methods.

MSIM 763. Distributed Simulation. 3 Credits.
Lecture, 3 hours. 3 credits. An introduction to parallel and distributed simulation. Topics include motivation for using distributed simulation, computing models for distributed simulation, causality and time advance issues, and strategies for implementing distributed simulations. Current standards for distributed simulation are presented. Course is only open to students admitted to the online ME program in modeling and simulation.

MSIM 772. Modeling Global Events. 3 Credits.
Lecture 3 hours; 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.
Lecture, 3 hours; 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.
Lecture 3 hours; 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 781. Imaging Technologies for Homeland Security. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: Calculus and Linear Algebra. This course introduces the fundamentals of various imaging technologies that are used in Homeland Security applications, including Visible, Infrared, Ultrasound, X-ray, and Terahertz. Models for the different technologies will be discussed vis-à-vis their application to homeland security. Visible imagery will be examined in detail for reconnaissance and surveillance. Joint use of data for image and information fusion or security applications will also be examined. (Cross listed with ECE 781).

MSIM 795. Topics in Modeling and Simulation. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: permission of instructor or graduate program director. Individual study selected by the student. Supervised and approved by a faculty member with the approval of the graduate program director.

MSIM 802. Methods of Rational Decision Making. 3 Credits.
Lecture 3 hours; 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 702/802).

MSIM 811. Finite Element Analysis. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: 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 820. Foundations for Continuous and Real-Time Simulation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: calculus-based physics and ordinary differential equations. Introduction to the fundamentals of modeling and simulating continuous-state, time-driven systems. Topics include use of physics laws to develop differential equation representation of systems and formulation of input/output and state variable equations for systems. Linearization, numerical integration, and techniques for computer based solutions of differential equations are covered. Application domains include mechanical, rotational, electrical, hydraulic, and thermal systems.
MSIM 822. Cluster Parallel Computing. 3 Credits.
Lecture, 3 hours; 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 825. Principles of Combat Modeling and Simulation. 3 Credits.

MSIM 830. Simulation Formalisms. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MSIM 601 or equivalent. 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; interoperability protocols; and computational complexity.

MSIM 842. Visualization II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: 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 852. Analysis II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MSIM 603 or equivalent. This course will expand the student’s capabilities in areas of stochastic analysis and data analysis. Course will include the theoretical underpinnings of stochastic processes commonly encountered in the application of operations research, and it will examine the literature of applied stochastic methods.

MSIM 863. Distributed Simulation. 3 Credits.
Lecture, 3 hours. 3 credits. An introduction to parallel and distributed simulation. Topics include motivation for using distributed simulation, computing models for distributed simulation, causality and time advance issues, and strategies for implementing distributed simulations. Current standards for distributed simulation are presented. Course is only open to students admitted to the online ME program in modeling and simulation.

MSIM 872. Modeling Global Events. 3 Credits.
Lecture 3 hours; 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 874. Transportation Network Equilibrium. 3 Credits.
Lecture, 3 hours; 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 876. Simulation Modeling in Transportation Networks. 3 Credits.
Lecture 3 hours; 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 892. Doctor of Engineering Project. 1-9 Credits.
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.
Lecture 3 hours; 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.
Prerequisite: permission of instructor or graduate program director. Individual study selected by the student. Supervised and approved by a faculty member with the approval of the graduate program director.

MSIM 898. Research in Modeling and Simulation. 1-12 Credits.
1-12 credits. Prerequisite: permission of instructor and graduate program director. Supervised research prior to passing Ph.D. candidacy exam.

MSIM 899. Modeling and Simulation 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 achieving “candidate” status, all doctoral students are required to be registered for at least one graduate credit each term until the degree is complete.

MUSA - Music, Applied

MUSIC, APPLIED Courses

MUSA 651. Advanced Applied Music. 3 Credits.
One hour lesson per week; 3 graduate credits each semester. Prerequisites: MUSC 452 or equivalent and permission of faculty. Numbers may be repeated. Completion of this level includes successful performance of a one-hour public recital.

MUSA 652. Advanced Applied Music. 3 Credits.
One hour lesson per week; 3 graduate credits each semester. Prerequisites: MUSC 452 or equivalent and permission of faculty. Numbers may be repeated. Completion of this level includes successful performance of a one-hour public recital.

MUSC - Music

MUSIC Courses

MUSC 600. Introduction to Graduate Research. 1 Credit.
Lecture 1 hour. 1 credit. This course should be taken among the first courses in the M.M.E. Program. Introduces graduate students to basic skills in Music Education research, including bibliographic searches, on-line searches, computer data analysis, and conventions of scholarly writing for reporting findings.

MUSC 602. Analytical Techniques. 3 Credits.
Lecture, 3 hours; 3 credits. Prerequisite: Baccalaureate degree in music or permission of department chair and instructor. Examines techniques and concepts applied to compositions of the eighteenth, nineteenth, and twentieth centuries as well as modern music, through analysis of contrapuntal and harmonic textures, form, and performance practice.
MUSC 603. Foundations of Music Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Baccalaureate degree in music or permission of the department chair and instructor. Methods, techniques, principles, and tools of music education, with reference to various types of school situations.

MUSC 604. Foundations of Music Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Baccalaureate degree in music or permission of the department chair and instructor. This course involves the study of the philosophical, psychological and historical foundations of music related to curriculum development.

MUSC 605. Literature of the Wind Ensemble. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Baccalaureate degree in music or permission of the instructor. The course centers upon the study of the performance, review and analysis of symphonic band music. Suited especially to the needs of directors of secondary school and other nonprofessional wind ensembles.

MUSC 606. Choral Music Literature. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Baccalaureate degree in music or permission of the department chair and instructor. Survey of choral literature and practical performance practices from the Renaissance to the present.

MUSC 607. Orff Schulwerk Level I. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: undergraduate degree in music or music education. This course is a study of basic Orff Schulwerk techniques. Level I pedagogy includes instruction in the use of pentatonic scale, ostinato, elemental forms, improvisation, basic body movement and basic soprano recorder skills.

MUSC 608. Orff Schulwerk Level II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: MUSC 607 and proficiency on the soprano recorder. Introduction of Alto recorder occurs in Level II. Also included is an in-depth study of Orff Schulwerk Vol. III in which the student will be instructed in the use of I, IV, V harmony. Body movement and extensive study of folk dance are included.

MUSC 609. Literature of the Orchestra. 3 Credits.
Lecture 3 hours; 3 credits. This course reviews repertoire selection criteria for elementary through high school, score analysis, and historical development of the orchestra. Suited especially for public school orchestra teachers.

MUSC 610. Orff Schulwerk Level III. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: MUSC 607 and 608. 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.

MUSC 611. Current Trends in Elementary and Secondary Music. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Baccalaureate degree in music or permission of the department chair and instructor. 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.

MUSC 612. Organization and Administration of Instrumental Music. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Baccalaureate degree in music or permission of instructor. 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.

MUSC 613. Workshop in Music Education. 1 Credit.
Lecture 1 hour; 1 credit. Prerequisite: Baccalaureate degree in music or permission of the department chair and instructor. This course centers upon the development of performance and instructional skills in various aspects of music education. May be repeated twice with different emphases.

MUSC 614. Workshop in Instrumental Music. 1 Credit.
Lecture 1 hour; 1 credit. Prerequisite: Baccalaureate degree in music or permission of the department chair and instructor. The course centers upon the development of performance and instrumental skills in various aspects of instrumental music. May be repeated twice with different emphases.

MUSC 615. Workshop in Choral Music. 1 Credit.
Lecture 1 hour; 1 credit. Prerequisite: Baccalaureate degree in music or permission of the department chair and instructor. 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.

MUSC 616. Advanced Conducting Seminar. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: Baccalaureate degree in music or permission of instructor or department chair. 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.

MUSC 620. Lit Strings/Symphony Orchestra. 3 Credits.

MUSC 623. Arranging for Instrumental Ensembles. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: passing the graduate theory placement test. 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.

MUSC 630. Research in Music Education. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: ECI 600. 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.

MUSC 635. The Use of Computers and Midi Technology in the Classroom. 3 Credits.
Lecture 3 hours; 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.

MUSC 636. Techniques of Jazz Education in the Secondary School. 3 Credits.
Lecture 3 hours; 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.

MUSC 639. Vocal/Choral Arranging. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: passing the Theory Placement Test. 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.

MUSC 680. Performing Ensembles. 1 Credit.
1 credit. Prerequisite: permission of the instructor. Students may enroll in any of the departmental ensembles with the permission of the ensemble director. Students registered for graduate credit are expected to help with sectional rehearsals and do in-depth score study on all music being performed.
NMED - Nuclear Medicine Technology

NUCLEAR MEDICINE TECHNOLOGY Courses

NMED 695. Topics in Nuclear Medicine. 1-3 Credits.
NMED 697. Directed Study in Nuclear Medicine. 1-3 Credits.
NMED 698. Research. 3 Credits.
NMED 699. Thesis. 3 Credits.

NURA - Nurse Anesthesia

NURSE ANESTHESIA Courses

NURA 650. Medical Physical Sciences. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: admission to program. Prepares the health care worker for a more advanced role on the health care team by providing an introduction to physics and biochemistry.

NURA 651. Pharmacology of Anesthesia Drugs. 4 Credits.
Lecture 4 hours; 4 credits. Prerequisite: NURA 650. Prepares the R.N. for a role on the anesthesia patient care team and in the administration of anesthesia by teaching analysis, synthesis, and evaluation skills in selecting and discussing appropriate anesthesia drugs for utilization in patient care situations.

NURA 652. Principles of Anesthesia Practice I. 4 Credits.
Lecture 4 hours; 4 credits. Prerequisite: NURA 650. Prepares the R.N. for a role on the anesthesia patient care team and in the administration of anesthesia by teaching a basic level of expertise in understanding and using anesthesia equipment in a competent and safe manner.

NURA 653. Principles of Anesthesia Practice II. 4 Credits.
Lecture 3 hours; laboratory, 2 hours. 4 credits. Prerequisite: NURA 652. This is the second course in the series on basics of anesthesia practice. Prepares the R.N. for a role on the anesthesia patient care team and in the administration of anesthesia by teaching a basic level of cognitive, affective, and psychomotor expertise for the pre-operative, perioperative, and postoperative anesthesia periods.

NURA 654. Professional Aspects of Anesthesia. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: admission to program. A study of the unique goals, difference means, distinctive content, and special problems of health/anesthesia care and education in this country. Includes such areas as management, organization, legal aspects, professional adjustments, ethics, psychology, and history.

NURA 655. Principles of Anesthesia Practice III. 4 Credits.
Lecture 4 hours; 4 credits. Prerequisite: NURA 653. Continuation of role preparation in administration of anesthesia.

NURA 660. Pharmacotherapeutics for the Nurse Anesthetist. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: admission to program. This course is designed to expand the graduate nurse anesthetist student's understanding of pharmacological principles including pharmacokinetics and pharmacodynamics in the advanced practice role of nurse anesthesia.

NURA 694. Advanced Physical Assessment for Nurse Anesthetists. 3 Credits.
Lecture 2 hours; laboratory 2 hours; 3 credits. Prerequisites: NURS 646, 647, NURA 652. Emphasis on physical assessment skills, interviewing skills, pathophysiological concepts, airway evaluation and management skills as related to anesthetic care plan and decision making.

NURA 695. Topics in Nurse Anesthesia. 1-6 Credits.

NURA 754. Anesthesia Practicum. 4 Credits.
4 credits. Prerequisite: NURA 652. Orientation to the operating room and anesthesia. Additional selected clinical experiences.

NURA 755. Clinical Practicum A. 6 Credits.
6 credits for 755. 10 credits for 756, 757, 758. Each course consists of orientation to the Operating Room and the Anesthesia Department. Prerequisite: admission to the program. Provides actual administration of general and regional anesthesia with qualified clinical instructors (Anesthesiologists and/or CRNA’s). Weekly classroom sessions consist of clinical conferences; journal club; and seminars dealing with current topics, including, but not necessarily limited to, respiratory, cardiovascular, thoracic, neuro, regional, obstetrical, pediatric, and special areas of anesthesia. Various special projects and competency examinations are administered throughout this phase.

NURA 756. Clinical Practicum B. 10 Credits.
6 credits for 755. 10 credits for 756, 757, 758. Each course consists of orientation to the Operating Room and the Anesthesia Department. Prerequisite: admission to the program. Provides actual administration of general and regional anesthesia with qualified clinical instructors (Anesthesiologists and/or CRNA’s). Weekly classroom sessions consist of clinical conferences; journal club; and seminars dealing with current topics, including, but not necessarily limited to, respiratory, cardiovascular, thoracic, neuro, regional, obstetrical, pediatric, and special areas of anesthesia. Various special projects and competency examinations are administered throughout this phase.
NURA 757. Clinical Practicum C. 10 Credits. 
6 credits for 755. 10 credits for 756, 757, 758. Each course consists of orientation to the Operating Room and the Anesthesia Department. Prerequisite: admission to the program. Provides actual administration of general and regional anesthesia with qualified clinical instructors (Anesthesiologists and/or CRNA’s). Weekly classroom sessions consist of clinical conferences; journal club; and seminars dealing with current topics, including, but not necessarily limited to, respiratory, cardiovascular, thoracic, neuro, regional, obstetrical, pediatric, and special areas of anesthesia. Various special projects and competency examinations are administered throughout this phase.

NURA 758. Clinical Practicum D. 10 Credits. 
6 credits for 755. 10 credits for 756, 757, 758. Each course consists of orientation to the Operating Room and the Anesthesia Department. Prerequisite: admission to the program. Provides actual administration of general and regional anesthesia with qualified clinical instructors (Anesthesiologists and/or CRNA’s). Weekly classroom sessions consist of clinical conferences; journal club; and seminars dealing with current topics, including, but not necessarily limited to, respiratory, cardiovascular, thoracic, neuro, regional, obstetrical, pediatric, and special areas of anesthesia. Various special projects and competency examinations are administered throughout this phase.

NURS 610. Theoretical Foundations for Nursing Practice. 3 Credits. 
Lecture 3 hours; 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. 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. 
Lecture 3 hours; 3 credits. Builds upon the knowledge of the research process learned at the baccalaureate level. This course focuses on the development of research and scientific inquiry skills necessary for advanced practice. Emphasis is placed on investigation of research problems and the understanding of research design.

NURS 613. Issues in Advanced Nursing Practice. 3 Credits. 
Lecture 3 hours; 3 credits. Prerequisites: NURS 610, 611. 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.

NURS 615. Ethics of Advanced Practice Nursing. 2 Credits. 
Lecture, 2 hours; 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. 
Clinical experience 8 hours; 2 credits. Prerequisite: admission to the program. 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.

NURS 617. Strategic Leadership: Transformational Strategies in Focus Area. 2 Credits. 
Clinical experience 8 hours; 2 credits. Prerequisite: NURS 616. 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.

NURS 618. Visionary Leadership: Transformational Strategies in Focus Area. 2 Credits.
Clinical experience 8 hours; 2 credits. Prerequisite: NURS 617. 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.

NURS 619. Advanced Nursing Practice IV. 6 Credits.
Clinical 24 hours; 6 credits. Prerequisite: NURS 674, 675. This clinical course provides an opportunity for concentrated clinical practice in the advanced nursing practice role.

NURS 620. Professional Relationships and Human Resources Management. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: admission to program or approval of instructor. 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.

NURS 621. Aging in the 21st Century. 3 Credits. 
Lecture, 3 hours; 3 credits. Corequisite: NURS 639. Prerequisites: NURS 610, 611, 670, 671, 672, 661. This course provides the MSN student with knowledge of core concepts that provide the foundation for Adult Gerontology Clinical Nurse Specialist practice.

NURS 630. Nursing Curriculum Design and Program Evaluation. 3 Credits. 
Lecture, 3 hours; 3 credits. Prerequisites: NURS 632 and 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. 
Lecture, 3 hours; 3 credits. Corequisite: NURS 634. This course describes models and methods for clinical instruction that facilitate learning and explores clinical evaluation methods and instruments.

NURS 634. Nurse Educator/Faculty Internship I Classroom Instruction. 2 Credits. 
2 credits. Corequisite: NURS 636. This practicum course is designed to provide the student with experience in classroom 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.
NURS 636. Instructional Delivery Methods in Nursing Education. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: NURS 634. 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.

NURS 638. Adult-Gerontology Clinical Nurse Specialist I: Introduction to Practice. 2 Credits.
Lecture, 2 hours; 2 credits. Prerequisites: NURS 610, 611, 670, 671, 672, 661, Corequisite: NURS 639. This course provides the MSN student with knowledge of core concepts that provide the foundation for Adult/Gerontology Clinical Nurse Specialist practice.

NURS 639. Adult-Gerontology Clinical Nurse Specialist Practicum I: Role Socialization. 3 Credits.
Lecture, 2 hours; 2 credits. Corequisite: NURS 638. Prerequisites: NURS 610, 611, 670, 671, 672, 661. This clinical course focuses on Adult-Gerontology Clinical Nurse Specialist practice. Concepts presented in the didactic component (NURS 638) will be actualized in the clinical setting.

NURS 642. Advanced Maternal Child Nursing II: Common Health Problems and Health Promotion of Children. 3 Credits.
Lecture 3 hours; 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.
Lecture 2 hours; 2 credits. Corequisite: NURS 649. Prerequisite: NURS 634 and 636. 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.

NURS 645. Nursing Curriculum Design and Course Development. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: NURS 649. Prerequisites: NURS 634 and 636. 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 outcomes to guide course design and determine course content and sequencing.

NURS 646. Structure and Function for Advanced Nursing Practice I. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: admission to the program. This course is designed to provide in-depth 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.

NURS 647. Structure and Function for Advanced Nursing Practice II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: NURS 646. This course is designed to provide in-depth 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.

NURS 648. Disease Processes for Advanced Practice. 3 Credits.
Lecture 2 hours; 2 credits. Prerequisites: NURS 646 and 647. This course examines topics in selected disease processes. The course focuses on the significance of the disease for advanced nursing practice.

NURS 649. Nurse Educator/Faculty Internship II Clinical Instruction. 2 Credits.
Lecture 2 hours; 2 credits. Corequisites: NURS 644, 645. Prerequisites: NURS 634 and 636. 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.

NURS 654. Assessment and Evaluation in Nursing Education. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: NURS 656. Discusses the importance of assessment and evaluation in the development of the nursing curriculum. The importance of assessment in the promotion of quality clinical instruction and the role of the student in evaluating learning are emphasized. The emphasis is on selecting instruments, data collection methods and reporting procedures to guide assessment and evaluation processes that are appropriate for what is being examined.

NURS 655. Adult-Gerontology Clinical Nurse Specialist II: Transition to Practice. 2 Credits.
Lecture 2 hours; 2 credits. Corequisite: NURS 654. Prerequisites: NURS 610, 611, 670, 671, 672, 661, 638, 639. This course provides the MSN student with knowledge necessary for developing Adult-Gerontology Clinical Nurse Specialist practice and leadership skills.

NURS 657. Adult-Gerontology Clinical Nurse Specialist Practicum II: Role Transition. 3 Credits.
Lecture, 2 hours; 2 credits. Corequisite: NURS 655. Prerequisites: NURS 610, 611, 670, 671, 672, 661, 638, 639. This course provides the MSN student with knowledge necessary for developing Adult-Gerontology Clinical Nurse Specialist practice.

NURS 660. Advanced Nursing Practice in Women's Health I. 2 Credits.
Clinical experience 8 hours; 2 credits. Corequisites: NURS 660, 661, 663, and 762. Prerequisites: NURS 661, 670, 671, 672, and 714. This course focuses on the development of advanced practice skills in the care of women.

NURS 661. Pharmacotherapeutics for Primary Health Care Providers. 3 Credits.
Clinical experience 24 hours; 6 credits. Prerequisites: NURS 661, 662, 663, 664, 665, 670, 671, 672, 673, and 762. 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.

NURS 666. Health Promotion and Maintenance. 2 Credits.
Lecture 2 hours; 2 credits. Corequisite: NURS 667. Prerequisites: NURS 661, 714. This course provides the nurse practitioner student the opportunity to incorporate strategies of risk analysis and reduction, screening, lifestyle change, and disease detection and prevention in family health care.

NURS 664. Primary Care for Women. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: NURS 660. Prerequisites: NURS 661, 670, 671, 672, and 714. 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.
NURS 665. Advanced Family Nursing I Practicum. 2 Credits.
Clinical 8 hours; 2 credits. Prerequisites: NURS 661, 670, 671, 672, 714.
Corequisites: NURS 663, 664, 762. 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.

NURS 670. Advanced Pathophysiology. 3 Credits.
Lecture 3 hours; 3 credits. Corequisites: NURS 671 and 672. 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.
Seminar 2 hours; 1 credit. Corequisites: NURS 670 and 672. Emphasis is on advanced history taking, physical assessment and interviewing skills for advanced practice nursing.

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.
Clinical 8 hours; 2 credits. Prerequisites: NURS 661, 670, 671, 672. Continued advanced practice nursing in the care of children and their families.

NURS 675. Advanced Maternal Child Nursing Practice III. 2 Credits.
Clinical 8 hours; 2 credits. Corequisite: NURS 724. Prerequisite: NURS 674. Capstone clinical course in advanced practice nursing in the care of children and their families.

NURS 676. Professional, Ethical and Legal Concepts of Nursing Education. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: NURS 654. Prerequisites: NURS 634, 636, 644, 645 and 649. This course examines the professional, ethical and legal responsibilities of nurse educators to create positive learning environments for students. Emphasis is on issues that may violate the collaborative partnership between faculty and student including due process, education malpractice, academic dishonesty, sexual harassment, and documentation of academic failure in the clinical setting or classroom.

NURS 686. Synthesis of Advanced Practice Concepts in Adolescent Focus. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: NURS 661. This capstone course focuses on the synthesis of advanced practice concepts in the care of adolescents. Content includes successful models of care and models of collaborative practice in pediatrics.

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.

NURS 697. Topics: Independent Study. 1-3 Credits.

NURS 698. Independent Clinical Study. 1-3 Credits.
1-3 credits. Prerequisite: enrollment in the graduate nursing program and permission of the instructor. 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.

NURS 699. Thesis/Research Project. 1-3 Credits.
1-3 credits. Prerequisites: NURS 611, 640. Thesis/research project completion. Variable credit to be determined by research advisor. May be repeated as needed.

NURS 703. Adult-Gerontology Clinical Nurse Specialist Practicum III: Role Synthesis. 3 Credits.
3 credits. Prerequisites: NURS 610, 611, 670, 671, 672, 661, 638, 639, 656, and 657. This capstone course focuses on synthesis and application of key concepts related to Adult-Gerontology Clinical Nurse Specialist and Educator practice.

NURS 705. Primary Care Approaches for Children. 3 Credits.
Lecture 3 hours; 3 credits. Corequisite: NURS 784. Prerequisites: NURS 661, 663, 664, 665, 670, 671, 672, and 762. This course for the family nurse practitioner focuses upon primary healthcare problems in the pediatric population. Emphasis is placed upon assessment and management of healthy and ill children.

NURS 707. Informatics/Database Management. 3 Credits.
Lecture. 3 hours. 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.
Lecture 3 hours; 3 credits. Instructor approval required. 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.
Lecture 3 hours; 3 credits. Instructor approval required. 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.
Lecture, 3 hours. 3 credits. 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 Focused Primary Care. 1 Credit.
Lecture 2 hours. 1 credit. Prerequisites: admission to the FNP, WHNP or Postmaster’s FNP and WHNP program. Focus is on assessing psycho-social needs of adults. Content includes successful models of care and models of collaborative practice in pediatrics.

NURS 724. Management of Chronic Problems and Illnesses. 3 Credits.
Lecture 3 hours; 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. Lecture 3 hours; 3 credits. This course examines current topics and issues on health disparities of underserved populations, intervention and policy research using an interdisciplinary perspective including structural, financial, and personal barriers to healthcare and mediators that contribute to health disparities of underserved populations. Particular emphasis will be given to racial and ethnic issues. Students will design and test culturally appropriate interventions to address the most influential barriers that hinder the achievement of optimal health outcomes of underserved populations. Students will design evidence-based interventions based on current national mandates (Institute of Medicine [IOM], American Nurses Association [ANA], National Institutes of Health [NIH], U.S. Department of Health and Human Services [USDHHS], Health People 2010 goals, Joint Commission on Accreditation of Healthcare Organizations [JCAHO], and other agency related regulatory or subspecialty specific initiatives related to provision comprehensive and sensitive healthcare.)

NURS 735. Organizational Leadership. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: Admission to program or approval of instructor. 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.

NURS 740. Strategic Leadership. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: admission to program, NURS 735, or approval of instructor. 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.

NURS 745. Visionary Leadership. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: NURS 735, 740, admission to program or approval of instructor. 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. Capabilities for envisioning profound changes within the health care system will be developed. Transformation/Futurist theory will be applied to envision market change for health care systems to be strategically positioned for future trends.

NURS 762. Advanced Family Nursing I: Management of Acute Illnesses. 3 Credits. Lecture 3 hours; 3 credits. Corequisites: NURS 658 (for women’s health nurse practitioner students), 663, 664, and 665 (for family nurse practitioner students). Prerequisites: NURS 661, 670, 671, 672, and 714. 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.

NURS 764. Advanced Family Nursing II Practicum. 4 Credits. Clinical 16 hours; 4 credits. Prerequisites: NURS 661, 663, 664, 665, 670, 671, 672, 714, and 762. Corequisite: NURS 705. 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.

NURS 765. Advanced Family Nursing II: Management of Chronic Illnesses. 3 Credits. Lecture 3 hours; 3 credits. Corequisites: NURS 767 and 768. Prerequisites: NURS 661, 663, 664, 665, 670, 671, 672, 705, 714, 762, and 764. 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).

NURS 767. Advanced Family Nursing III Practicum. 5 Credits. Clinical 20 hours; 5 credits. Prerequisites: NURS 661, 663, 664, 665, 670, 671, 705, 714, 762, and 764. Corequisites: NURS 765 and 768. 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.

NURS 768. Nursing Seminar in Complex Health Problems. 1 Credit. Seminar 2 hours; 1 credit. Corequisites: NURS 765, 767. Prerequisites: NURS 613, 640, 705, 764. 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.

NURS 780. Financial Issues in Nursing Administration. 3 Credits. Lecture 3 hours; 3 credits. Corequisites: NURS 617 and 640. Prerequisites: NURS 616, 735. 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.

NURS 787. Advanced Perinatal Nursing. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: NURS 659. Prerequisites: NURS 658, 661, 663, 664, 670, 671, 672, 714, and 762. This course focuses on the advanced nursing management of perinatal health for women.

NURS 795. Topics. 1-3 Credits. Lecture 3 hours; 3 credits. Prerequisite: 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. Lecture 3 hours; 3 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.

NURS 801. DNP Integrative Concepts II. 3 Credits. Lecture 3 hours; 3 credits. This course focuses on role expectations for doctoralally 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. Lecture 3 hours; 3 credits. Co-requisite: NURS 865. This course will explore the business dimensions of practice including legal, safety, quality and financial.

NURS 803. Leadership/Management in Healthcare. 3 Credits. Lecture 3 hours; 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 866. Practice-Based Research/Evaluation. 4 Credits.
Lecture 4 hours; 4 credits. Co-requisite: NURS 866. Prerequisites: NURS 800, 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.

NURS 807. Informatics/Database Management. 3 Credits.
Lecture, 3 hours. 3 credits. This course will cover the use of data in health care as well as other informatics applications.

NURS 809. Health Care Planning and Policy for Advanced Practice. 3 Credits.
Lecture 3 hours; 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.
Lecture, 3 hours. 3 credits. Corequisite: NURS 800. 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.
Lecture, 3 hours. 3 credits. Prerequisite: 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.
Lecture, 3 hours. 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 816. Nursing Executive Leadership I. 1-3 Credits.
Internship, 1-3 credits. Corequisite: NURS 804. Prerequisite: NURS 800. This experience focuses on the application of executive leadership skills in nursing.

NURS 817. Nursing Executive Leadership II. 3-5 Credits.
Internship, 3-5 credits. Corequisite: NURS 806. Prerequisite: NURS 804, 816. This experience focuses on the application of executive leadership skills in nursing.

NURS 818. Nursing Executive Leadership III. 3-5 Credits.
Internship, 3-5 credits. Corequisite: NURS 807. Prerequisite: NURS 800, 816, 817. This experience focuses on the application of executive leadership skills in nursing.

NURS 819. Nursing Executive Leadership IV. 3-5 Credits.
Internship, 3-5 credits. Corequisite: NURS 890. Prerequisite: NURS 800, 816, 817, 818. Application of Nurse Executive Role.

NURS 865. Clinical Practicum I. 2 Credits.
2 Credits. Clinical practicum for DNP course.

NURS 866. Clinical Practicum II. 2 Credits.
Residency 8 hours; 2 credits. Co-requisite: NURS 806. 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 evidence-based practice, teamwork, evidence-based research, and advanced clinical diagnostics.

NURS 867. Clinical Practicum III. 3 Credits.
Residency 12 hours; 3 credits. Co-requisite: NURS 807. Prerequisites: NURS 800, 801, 802, 803, 806. This course is designed to provide the Advanced Practice Nurse with the knowledge and skills to practice as an expert clinician, a program evaluator, and a team leader within a practice-based setting focusing on evidence-based practice.

NURS 868. Clinical Practicum IV. 3 Credits.
Residency 12 hours; 3 credits. Co-requisite: NURS 890. Prerequisites: NURS 800, 801, 802, 803, 806, 807. 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.

NURS 890. Nursing Capstone. 3 Credits.
Lecture 3 hours; 3 credits. Co-requisite: NURS 868. 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.
Lecture 3 hours; 3 credits. Prerequisite: 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.

OEAS - Ocean, Earth & Atmospheric Sci

OCEAN, EARTH ATMOSPHERIC SCI Courses

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.
Laboratory 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 617. Applied Geochemistry. 3 Credits.
Lecture 3 hours; 3 credits. Soil and contaminant properties, soil-water interaction, soil permeability, contaminant-soil interactions, water and contaminant attenuation and movement in unsaturated zone of inorganic and organic contaminants are discussed.

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. Sediments and Sediment Dynamics. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: OEAS 620. Attributes of marine sediments; boundary layer fluid dynamics and sediment transport; characteristics of cohesive and noncohesive sediments; gravity transport; grain size frequency distributions, strata formation and biotic reworking of sediments.

OEAS 628. Depositional Systems. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: OEAS 620. Marine depositional environments, facies assemblages and the morphodynamics of their formation; numerical models of sediment accumulation.

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 semi-quantitative 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. 3 Credits.
Lecture 3 hours; 3 credits. Marine organisms and their interactions with the physical and chemical environments of the sea; primary production, population ecology, nutrition, reproduction, and marine biogeography.

OEAS 643. Primary Prdcts-Marine Envir. 3 Credits.

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 657. Geological Aspects of Hazardous Waste Management. 3 Credits.
Lecture 3 hours; 3 credits. Waste characterization including classification, source and types of wastes and waste management. Major disposal methods (landfills, land disposal, underground injection and geologic repositories) that affect geologic materials and ground water are discussed.

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 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 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 712. Radiogeochemistry of the Ocean. 3 Credits.
Lecture 3 hours; 3 credits. Sources of radioactivity in the oceans; marine geochemistry of radioactive nuclides; tracking marine processes with radioactive nuclides.

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.

OEAS 730. Dynamical Oceanography II. 3 Credits.
Lecture 3 hours; 3 credits. Dynamics of rotating stratified fluids. Inertial waves, equatorial dynamics, coastal dynamics, dynamic instability.

OEAS 732. Advanced Geochemistry of Marine Sediments. 3 Credits.
Lecture 3 hours; 3 credits. Advanced topics in the geochemistry of marine sediments, with an emphasis on mathematical modeling of sedimentary geochemical processes.

OEAS 733. Marine Microbiology. 3 Credits.
Lecture. 3 hours. 3 credits. 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.

OEAS 735. Paleoclimatology. 3 Credits.
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.

OEAS 741. Fisheries Science. 3 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 743. 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 744. 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 747. 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 750. Dynamics of Large Scale Ocean Circulation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: OEAS 730. Quasi-geostrophic beta-plane dynamics, wind driven circulation, thermohaline circulation, effects of bathymetry, quasi-geostrophic waves, effects of mesoscale eddies, layered models with outcrops and ventilation.

OEAS 755. 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 760. Microbial Ecology of Marine Benthic Environments. 3 Credits.
Lecture 3 hours; 3 credits. The course emphasizes the role of microorganisms in the transfer and cycling of energy and matter on centimeter to global scales. Lectures cover microbiological organisms, processes, and methods in benthic regimes ranging from the intertidal to the deep sea, in hydrothermal and coldwater vents, and in hydrocarbon seeps.

OEAS 764. 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 765. 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 770. 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 772. 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 795. 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 800. Survival Skills for Scientists. 1 Credit.
Seminar 1 credit, P/F. Seminar class each fall and spring that will address a series of topics to improve student success as scientists.

OEAS 803. 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 804. 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 808. 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 811. 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 812. Radiogeochemistry of the Ocean. 3 Credits.
Lecture 3 hours; 3 credits. Sources of radioactivity in the oceans; marine geochemistry of radioactive nuclides; tracking marine processes with radioactive nuclides.

OEAS 816. Aquatic Chemistry. 3 Credits.

OEAS 823. 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.

OEAS 830. Dynamical Oceanography II. 3 Credits.
Lecture 3 hours; 3 credits. Dynamics of rotating stratified fluids. Inertial waves, equatorial dynamics, coastal dynamics, dynamic instability.

OEAS 832. Advanced Geochemistry of Marine Sediments. 3 Credits.
Lecture 3 hours; 3 credits. Advanced topics in the geochemistry of marine sediments, with an emphasis on mathematical modeling of sedimentary geochemical processes.

OEAS 833. Marine Microbiology. 3 Credits.
Lecture, 3 hours. 3 credits. 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.

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 Science. 3 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 850. Dynamics of Large Scale Ocean Circulation. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: OEAS 730. Quasi-geostrophic beta-plane dynamics, wind driven circulation, thermlaheline circulation, effects of bathymetry, quasi-geostrophic waves, effects of mesoscale eddies, layered models with outcrops and ventilation.

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 860. Microbial Ecology of Marine Benthic Environments. 3 Credits.
Lecture 3 hours; 3 credits. The course emphasizes the role of microorganisms in the transfer and cycling of energy and matter on centimeter to global scales. Lectures cover microbiological organisms, processes, and methods in benthic regimes ranging from the intertidal to the deep sea, in hydrothermal and coldwater vents, and in hydrocarbon seeps.

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.
in the semester prior to enrollment. Allowable credits are determined by the department and Career Management.

1-3 credits. Prerequisite: graduate standing. Approval for enrollment and allowable credits are determined by the department and Career Management.

**OPMT 667. COOPERATIVE EDUCATION. 1-3 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 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.

**OTED - Occupational Technical Educ**

**Courses**

**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 Public 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 718. Public Sector Contract Administration. 3 Credits.
Lecture 3 hours; 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, local preference issues, and the impact of fraud, waste and abuse in public sector contracting.

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 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 726. Introduction to Public Procurement. 3 Credits.
Lecture 3 hours; 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 structure, regulations, process and methods, and current issues in public procurement.

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 728. Public Sector Contract Planning and Formation. 3 Credits.
Lecture, 3 hours; 3 credits. Course covers all phases of the contract formulation process with a focus on the RFP and RFB procedure, documents, and other technical issues.

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 731. Public Sector Procurement Law and Ethics. 3 Credits.

PADM 733. Legal and Ethical Foundations of Public Administration. 3 Credits.
Lecture 3 hours; 3 credits. Introduces the role of law in ordering public administration through the application of constitutional values and administrative law principles in administrative practice. Introduces ethical theories and applications in the public sector, examining values within administrative environments. Topics include privacy in information systems management, whistleblowing, and other cases of applied ethical reasoning in the practice of public administration.

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 737. 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.

PADM 738. 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.

PADM 745. Managing Development and Change in 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.

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 administrative choices. The emphasis of the course will be a case approach to public administration and public management.
PAUP 753. 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.

PAUP 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 noneperimental 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–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 completes independent applied research. The completed project must be approved by the dissertation committee.

PHIL - Philosophy

OLD DOMINION UNIVERSITY 101
PHILOSOPHY Courses

PHIL 603. Studies in Social and Political Philosophy. 3 Credits.
Lecture 3 hours; 3 credits. One 500-level Philosophy course with a grade of “B” or higher (or equivalent). An intensive study of some or more figures, movements, or theoretical questions in social and political philosophy.

PHIL 606. Studies in Asian Philosophy. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: One 500-level Philosophy course with a grade of “B” or higher (or equivalent). A study of certain philosophers, movements or specific philosophical issues in the ancient Greek and early Roman periods.

PHIL 609. Studies in the Philosophy of Science. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: One 500-level Philosophy course with a grade of “B” or higher (or equivalent). A philosophical study of rights applicable to the international arena. Theories from the early Modern European period to the present day will be treated.

PHIL 610. Studies in the Philosophy of Art. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: One 500-level Philosophy course with a grade of “B” or higher (or equivalent). An evaluation of the field of art in relation to the rest of human culture, emphasizing the various approaches that may be used.

PHIL 611. Studies in the History of Philosophy. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: One 500-level Philosophy course with a grade of “B” or higher (or equivalent). A consideration of selected themes in the history of philosophy, or the specific examination of one major philosopher or group of related philosophers.

PHIL 695. Topics in Philosophy. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: 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 qualified students to work in subjects of mutual interest that, die to their specialized nature, may not be offered regularly.

PHIL 697. Tutorial Work in Special Topics in Philosophy. 1-3 Credits.
1-3 credits each semester. Prerequisite: approval of the department chair and one 500-level Philosophy course with a grade of “B” or higher (or equivalent). Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

PHIL 698. Tutorial Work in Special Topics in Philosophy. 1-3 Credits.
1-3 credits each semester. Prerequisite: approval of the department chair and one 500-level Philosophy course with a grade of “B” or higher (or equivalent). Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

PHIL 699. Tutorial in Philosophy. 1-3 Credits.
Lecture 3 hours; 3 credits. The advanced study of special topics that may not be offered regularly.

PHIL 707. Ethics in Public Health Practice. 1-3 Credits.
1-3 credits. Prerequisite: open to all graduate students in relevant fields. 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.

PHIL 807. Ethics in Public Health Practice. 1-3 Credits.
1-3 credits. Prerequisite: approval of instructor. 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.

PHIL 895. Topics in Philosophy. 3 Credits.
Lecture 3 hours; 3 credits. The advanced study of special topics that may not be offered regularly.

PHIL 897. Tutorial in Philosophy. 1-3 Credits.
1-3 credits each semester. Prerequisite: approval of the department chair. Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

PHYS - Physics

PHYSICS Courses

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.
Lecture 3 hours; 3 credits. Prerequisite: PHYS 621. Further development of
quantum mechanics. Multi-particle states, bosons and fermions. Classical
Limit. Variational principle, time-dependent perturbation theory and
scattering. Path integral formulation. Symmetry and groups, addition of
angular moments. Examples from solid state, atomic, nuclear, and particle
physics.

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 haldon. 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 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 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.
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 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.
Lecture 3 hours; 3 credits. Prerequisite: PHYS 621. Further development of
quantum mechanics. Multi-particle states, bosons and fermions. Classical
Limit. Variational principle, time-dependent perturbation theory and
scattering. Path integral formulation. Symmetry and groups, addition of
angular moments. Examples from solid state, atomic, nuclear, and particle
physics.

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. Prerequisites: 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 II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PHYS 621. Further development of
quantum mechanics. Multi-particle states, bosons and fermions. Classical
Limit. Variational principle, time-dependent perturbation theory and
scattering. Path integral formulation. Symmetry and groups, addition of
angular moments. Examples from solid state, atomic, nuclear and particle
physics.

PHYS 828. 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 829. 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.
Lecture 1 hour; 1 credit. Written and oral communication skills as applied to physics. Data display techniques for 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 equations 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 602. Seminar in American Foreign Policy. 3 Credits.
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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours, 3 credits. Prerequisite: director or instructor's permission. 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.
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.
Lecture and discussion 3 hours; 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 neuroses, personality disorders, and psychophysiological disorders.

PSYC 662. Human-Computer Interface Design. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: PSYC 616. This 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.
Lecture and discussion 3 hours; 3 credits. Prerequisite: PSYC 616. "Selected Topics in Psychology" topics include tests of achievement and memory function. 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 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 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 (IRT) 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 and 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 log-linear 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, etc. 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 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 820. 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.
Lecture 3 hours; Lab 2 hours; 4 credits. Prerequisite: admission into Virginia Consortium PSYD program or permission of the instructor. 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.

PSYC 825. ODU Research Methods II: Regression and Correlational Design. 4 Credits.
Lecture 3 hours; Lab 2 hours; 4 credits. Prerequisite: admission into Virginia Consortium PSYD program or permission of the instructor. 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 827. Analysis of Variance and Experimental 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. 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 to: (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, multivariate 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 and 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 conceptualization/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. Advanced Personnel Psychology I. 3 Credits.
Lecture and discussion 3 hours; 3 credits. Prerequisite: PSYC 763/863 or permission of the instructor. 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).

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, 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 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 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 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 999. 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.
Lecture 2 hours; 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.
Lecture 3 hours; laboratory 3 hours; 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.
Lecture 3 hours; laboratory 3 hours; 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.
Lecture 1 hour; 1 credit. The emphasis in this course is on histology, 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.
Lecture 3 hours; 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 pathohlogy in the care of the patient.

PT 635. Clinical Sciences II. 3 Credits.
Lecture 3 hours; 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.
Lecture, 2 hours; 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.
Lecture 2 hours; laboratory 2 hours; 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.
Lecture 2 hours; laboratory 2 hours; 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.
2 Credits. Lecture Hour and 4 Lab Hours. Corequisite: Student must be first year PT Students enrolled in the 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.

PT 656. Clinical Problem Solving II. 2 Credits.
Lecture 2 hours; 2 credits. Student must be enrolled in the Physical Therapy curriculum. No waiver of prerequisite allowed. 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.
PT 666. Biomechanics/Kinesiology II. 2 Credits.
Lecture 1 hour; laboratory 2 hours; 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.
Field experience 40 hours/week; 8 weeks; 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.

PT 699. Thesis Research. 3 Credits.

PT 792. Neuroscience I. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: BIOL 889. 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.

PT 793. Neuroscience II. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: PT 792 and BIOL 889. 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.

PT 810. Scientific Inquiry I. 3 Credits.
Lecture 1 hours; seminar sessions 2 hours; 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.
Lecture 2 hours; 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.
Lecture 2 hours; laboratory 4 hours; 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.
Lecture 2 hours; laboratory 4 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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 electrophysiologic testing.

PT 842. Patient Evaluation III. 3 Credits.
Lecture 2 hours; laboratory 2 hours; 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.
Lecture 1 hour; Lab 4 hours. 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 Orthopedic patients.

PT 881. Management of Special Populations. 2 Credits.
Lecture 2 hours; 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. Lecture 3 hours; 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. Lecture/ seminar 2 hours; 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. Lecture 3 hours; 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. Lecture 3 hours; 3 credits. Prerequisites: PT 634, 635, 836, and 837. 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. Lecture/seminar 3 hours; 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. Seminar 2 hours; 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.

PT 895. Topics in Physical Therapy I. 1 Credit. Lecture 1 hour; 1 credit. This grand round style course will feature case presentations and discussions led by specialists in their field.

PT 896. Topics in Physical Therapy II. 1 Credit. 1 hour; 1 credit. For this one credit hour course 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 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 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 621. Differentiated Literacy Instruction and Portfolio Development. 3 Credits. Lecture. 3 cr. Prerequisite: 15 Graduate Hours in Reading. Instruction in ways to differentiate instruction in literacy for students of differing abilities levels and diverse learning needs. Research-based frameworks and plans for differentiation as well as practical strategies will be emphasized. Electronic portfolio development will be used to build upon instruction from previous courses in the reading program.

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.

READ 689. Survey of Reading Instruction. 3 Credits. Lecture 3 hours; 3 credits. Prerequisite: graduate standing. Surveys the linguistic, psychological, sociological, philosophical, and historical foundations of current reading pedagogy.

READ 693. Practicum in Reading. 3 Credits. Hours to be arranged. Prerequisite: 15 hours in graduate reading to include READ 683 and permission of the instructor. This course provides advanced diagnostic techniques and is in addition to those covered in the initial diagnostic reading course.
REL - Religious Studies

RELIGIOUS STUDIES Courses
REL 697. Tutorial Work in Religious Studies. 1-3 Credits.
REL 698. Tutorial Work in Religious Studies. 1-3 Credits.

SEPS - Stem Educ & Prof Studies

STEM EDUC PROF STUDIES Courses
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 four-year institutions.

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 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 862. 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 865. 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 868. 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 graduate 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 638. Fiscal Planning and Management in Sport and Recreation. 3 Credits.
Lecture 3 hours; 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 RTS 638).

SMGT 646. Sport Marketing. 3 Credits.
Lecture 3 hours; 3 credits. This course will examine marketing concepts and principles that apply directly to the sport setting. Marketing research as it applies to a better understanding of the sport product and consumer will be analyzed. Special emphasis will be placed on studying and applying the steps in the marketing process.

SMGT 650. Ethics in Sport Management. 3 Credits.
Lecture 3 hours; 3 credits. This course is designed to provide students with an understanding of ethics and morals and how each applies in sport 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 environment. Models of ethical analysis, codes of ethics in sport organizations, and the development of a personal and administrative philosophy will also be emphasized. The case study approach will be used to examine ethical issues.

SMGT 652. Sport Facility Management. 3 Credits.
Lecture 3 hours; 3 credits. This course is designed to provide students with an understanding of ethics and morals and how each applies in sport 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 environment. Models of ethical analysis, codes of ethics in sport organizations, and the development of a personal and administrative philosophy will also be emphasized. The case study approach will be used to examine ethical issues.

SMGT 653. Sport Sponsorship/Event Planning. 3 Credits.
Lecture 3 hours; 3 credits. This course is designed to provide students with a detailed examination of the relationship between sport and corporate sponsorship. Topics will include sport sponsorship, strategic communication through sponsorship, sponsorship valuation, and evaluation of sponsorship packages. Special emphasis will be placed on the relationship between sport sponsorship development, event planning, and fund-raising.

SMGT 655. Sports in Society. 3 Credits.
Lecture 3 hours; 3 credits. The course will examine the nature and scope of sport from sociological, historical, economic, and philosophical perspectives. Special emphasis will be placed on studying selected issues and topics that impact sport managers and their understanding of the role that sport plays in society. Sport 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.

SMGT 660. Legal Aspects of Sport. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: graduate student standing. Course will introduce students to various aspects of the legal system as it relates to the management and supervision of sport facilities, programs, participants, spectators, and events. (cross-listed with RTS 660).

SMGT 664. Field Experience in Sport Management. 6 Credits.
6 credits. Prerequisite: permission of internship coordinator. Designed to provide detailed practical experience (400 clock hours) in a sport management field setting.

SMGT 675. Management and Leadership in Sport. 3 Credits.
Lecture 3 hours; 3 credits. This course will examine various management principles that relate to sport settings. Special emphasis will be placed on studying leadership theories, human resource management, strategic planning, decision making, problem solving, policy development, and governance in sport.

SMGT 697. Independent Study in Sports Management. 1-3 Credits.
SMGT 797. Independent Study in Sports Management. 1-3 Credits.
SMGT 897. Independent Study in Sports Management. 1-3 Credits.
SMGT 999. Sport Management 999. 1 Credit.

SOC - Sociology

SOCIIOLOGY Courses

SOC 610. Applied Social Research Methods. 3 Credits.
Lecture 3 hours; 3 credits. The application of social science methods to practical problems. The topics of research design, measurement, scaling, sampling, data collection, and research organization will be taught with reference to issues of reliability, validity and ethical concerns. (cross-listed with CRJS 610).

SOC 620. Proseminar in Sociological Theory. 3 Credits.
Lecture 3 hours; 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 between theory, research and practice.

SOC 627. Violence Against Women. 3 Credits.
Lecture 3 hours; 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. (cross-listed with CRJS 627).

SOC 630. Applied Social Statistics. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: SOC 610. 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. (cross-listed with CRJS 630).
SOC 640. Sociological Application of Computer and Data Analysis. 3 Credits.
Lecture and Lab 3 hours; 3 credits. Prerequisite: SOC 610. 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 (SPSS, SAS) to build specified data files and carry out various statistical procedures. (cross-listed with CRJS 640).

SOC 644. Current Feminist Research in Sociology. 3 Credits.
Lecture 3 hours; 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. (cross-listed with CRJS 644).

SOC 650. Research Seminar. 3 Credits.
3 credits. Prerequisites: SOC 610 or CRJS 610, SOC 620 or CRJS 620, SOC 630 or CRJS 630, and SOC 640 or CRJS 640. 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. (cross-listed with CRJS 650).

SOC 660. Sociology Seminar. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: SOC 610, 620, 630, 640, 6 hours of SOC electives. 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.

SOC 668. Internship. 3 Credits.
3 credits. Prerequisite: permission of the instructor. 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.

SOC 695. Topics of Sociology. 3 Credits.
Lecture 3 hours; 3 credits. Topics will vary each semester.

SOC 696. Topics of Sociology. 3 Credits.
Lecture 3 hours; 3 credits. Topics will vary each semester.

SOC 697. Independent Study in Special Topics in Sociology. 3 Credits.
3 credits. Prerequisite: approval of the department chair. Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

SOC 698. Independent Study in Special Topics in Sociology. 3 Credits.
3 credits. Prerequisite: approval of the department chair. Independent reading and study on a topic to be selected under the direction of an instructor. Conferences and papers as appropriate.

SOC 699. Thesis. 3-9 Credits.
3-9 credits.

SOC 740. Demographic Techniques. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: 6 hours of graduate credit. Topics will vary by semester.

SOC 797. Independent Study in Sociology. 1-3 Credits.
3 credits. Prerequisites: approval of department chair and 6 hours of graduate credit. Independent reading and study on a topic to be selected under the direction of an instructor.

SOC 840. Demographic Techniques. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Prerequisite: 6 hours of graduate credit. Topics will vary by semester.

SOC 897. Independent Study in Sociology. 1-3 Credits.
3 credits. Prerequisites: approval of department chair and 6 hours of graduate credit. Independent reading and study on a topic to be selected under the direction of an instructor.

SOC 999. SOC 999. 1 Credit.

SPAN - Spanish

SPANISH Courses

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 maintaining/improving linguistic 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.

SPED - Special Education
SPECIAL EDUCATION Courses

SPED 610. Characteristics of Student Accessing the General Curriculum. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: 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 LD, E/BD, ID; (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.
Lecture 3 hours; 3 credits. Prerequisite: SPED 500, SPED 515, SPED 610 and passing scores on Praxis or equivalent practicum of 45 hours required. 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.

SPED 615. Behavior Change in Classroom. 3 Credits.
Lecture 3 hours, 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.
Lecture 3 hours; 3 credits. Practicum of 45 hours required. Prerequisites: SPED 500 and 511 or equivalent and passing scores on PRAXIS I or equivalent*. 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.

SPED 621. Effective Interventions for Children and Youth with Challenging Behavior. 3 Credits.
Lecture 3 hours; 3 credits. Practicum of 45 hours required. Prerequisites: SPED 500 and 511 or equivalent and passing scores on PRAXIS I or equivalent*. 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.

SPED 623. Characteristics and Advanced Procedures: Intellectual Disabilities. 3 Credits.
Lecture 3 hours; 3 credits. Practicum of 45 hours required. Prerequisites: SPED 500 and 515 or equivalent and passing scores on PRAXIS I or equivalent*. The course examines the characteristics and various approaches to the education and treatment of students with mental retardation and developmental disabilities. Assessment, curriculum development, instructional design, appropriate placement setting, transition and utilization of environmental resources are emphasized.

SPED 625. Characteristics of Students with Autism Spectrum Disorders. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: 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.
Lecture 3 hours; 3 credits. Practicum of 45 hours required. Prerequisites: SPED 500, 515 and passing scores on PRAXIS I or equivalent*. 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.

SPED 627. Instructional Strategies for Students with Autism Spectrum Disorders. 3 Credits.
3 credits. Practicum of 45 hours required. Prerequisites: SPED 500, 515 and passing scores on PRAXIS I or equivalent*. 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.

SPED 630. Teaching Preschoolers with Disabilities. 3 Credits.
Lecture 3 hours; 3 credits. Practicum of 45 hours required. Prerequisites: SPED 500 and passing scores on PRAXIS I or equivalent. This course is designed to prepare students in curricula, materials and methods of instruction for preschool-aged (2 to 9 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.

SPED 631. Developmental and Ecological Assessment Strategies. 3 Credits.
Lecture 3 hours; 3 credits. Practicum of 45 hours required. Prerequisites: SPED 500 or the equivalent and passing scores on PRAXIS I or equivalent. 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 9 years of age in addition to students with severe disabilities.

SPED 633. Sensorimotor Development and Intervention Strategies. 3 Credits.
Lecture 3 hours; 3 credits. Practicum of 45 hours required. Prerequisites: SPED 500 and passing scores on PRAXIS I or equivalent. 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 having physical disabilities.

SPED 634. Capstone Seminar. 3 Credits.

SPED 637. Infant/Family Intervention and Teamwork. 3 Credits.
Lecture 3 hours; 3 credits. Practicum of 45 hours required. Prerequisites: SPED 500 and 630 and passing scores on PRAXIS I equivalent. 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 IFSP, procedures, materials and curriculum for this population. A family-centered approach is stressed.
SPED 638. Teaching Methods for Students with Visual Impairments. 3 Credits.
Lecture 3 hours; 3 credits. Co/Prerequisites: SPED 400 or SPED 500 and ESSE 432 or ESSE 532. Practicum of 45 hours required. 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.

SPED 639. Braille Reading and Writing. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: SPED 433 or SPED 533. Co/Prerequisites: SPED 500 and SPED 532. Practicum of 45 hours required. This course provides 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.

SPED 669. Directed Field Internship Special Education, K-12. 1-6 Credits.
1-6 credits. 50 hours per credit. Prerequisite: two of the following SPED 618, 621, 623, 624, 626, 628, 630 AND passing scores on PRAXIS I or State Board of Education-approved SAT or ACT scores. The course provides supervised involvement 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 special educators.

SPED 700. Social/Emotional Aspects of Child Development. 3 Credits.
Lecture, 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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 707. Advanced Instructional Procedures in Special Education. 3 Credits.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Practicum of 45 hours required. 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.

SPED 715. Alternative Strategies for Elementary Students: Prevention and Intervention. 3 Credits.
Lecture 3 hours; 3 credits. Practicum of 45 hours required. 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.

SPED 720. Curriculum and Instruction: Research Into Practice. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: two of the following - SPED 618, 621, 623, 624, 626, 628, 630, 714, 715. 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.

SPED 730. Single Subject Research. 3 Credits.

SPED 800. Social/Emotional Aspects of Child Development. 3 Credits.
Lecture, 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 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.
Lecture 3 hours; 3 credits. Practicum of 45 hours required. 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.
SPED 815. Alternative Strategies for Elementary Students: Prevention and Intervention. 3 Credits.
Lecture 3 hours; 3 credits. Practicum of 45 hours required. 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.

SPED 820. Curriculum and Instruction: Research Into Practice. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisites: two of the following - SPED 618, 621, 623, 624, 626, 628, 630, 714, 715. 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.

SPED 821. Critical Issues I: Readings in Special Education and Professional Writing. 3 Credits.
Lecture 3 hours. 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.
Lecture 3 hours; 3 credits. Prerequisite: SPED 821. This course provides doctoral candidates an opportunity to read, analyze and synthesize research in special education with the intent to 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 830. Single Subject Research. 3 Credits.

SPED 868. Internship: Urban Child Study/Special Education. 3 Credits.
3 credits. This course provides doctoral students an opportunity to gain practicum experience in human service agencies, in educational settings in urban school administration, and in other community education training projects.

SPED 869. Practicum/Field Experience. 6-12 Credits.
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.
Lecture 3 hours; 3 credits. Prerequisites: SPED 821 and 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.
1-12 credits. Prerequisite: Completion of candidacy examination.

SPED 999. Early Childhood and Special Education 999. 1 Credit.

STAT - Statistics

STATISTICS Courses

STAT 613. Applied Statistical Methods I. 3 Credits.
Lecture 3 hours; 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 statistical methods to address research questions will be emphasized. Examples will be given from 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.
626 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.
Lecture 3 hours; 3 credits. Prerequisite: STAT 626. 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.
STAT 628. Applied Multivariate Analysis. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: STAT 537 or 627 or permission of the instructor. 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.

STAT 630. Time Series Models. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: STAT 626, STAT 505, and STAT 537. 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.

STAT 632. 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.

STAT 635. Statistical Consulting. 3 Credits.
Lecture 1 hour; seminar 2 hours; 3 credits. Prerequisite: STAT 626. 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.

STAT 640. Survival Analysis. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: STAT 626. 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.

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.
1-3 credits. Prerequisite: permission of the instructor.

STAT 727. Statistical Inference I. 3 Credits.
Lecture 3 hours; 3 credits each semester. 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.

STAT 728. Statistical Inference II. 3 Credits.
Lecture 3 hours; 3 credits each semester. 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.

STAT 795. Seminar in Statistics. 1-3 Credits.
1-3 credits. Prerequisite: permission of the instructor.

STAT 797. Topics in Statistics. 1-3 Credits.

STAT 827. Statistical Inference I. 3 Credits.
Lecture 3 hours; 3 credits each semester. 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.

STEM - Science, Tech, Engr, Math Educ

SCIENCE, TECH, ENGR, MATH EDUC Courses

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 721. 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 730. Introduction to Technology. 3 Credits. Lecture 3 hours; 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 731. Technical Systems. 3 Credits. 3 credits. Analyze the technical concepts common and unique to the technical systems of technology.

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

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

TLCI - Tchng & Lrng - Curric & Instr

TCHNG LRNG - CURRIC INSTR Courses
TLCI 702. 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 703. 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 704. 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 705. 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 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.

TLCI 721. 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 curriculum innovations, and research in curriculum development.

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. Survey 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 725. 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 hours; 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.

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 curriculum 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 lifelong 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.

TLCI 831. 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 832. 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 835. 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 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.

TLCI 836. 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 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.
TLED - Teaching & Learning-Education

TEACHING LEARNING-EDUCATION Courses

TLED 608. Foundations of Education and Instructional Assessment. 3 Credits.
Lecture 3 hours; 3 credits. Prerequisite: 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.

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 problems 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 Convertor 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. Prerequisite: 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 at least 2.75. GPA of 3.0 required for graduate programs. 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 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/turics). 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 them 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 688. 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

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.
Lecture 3 hours; 3 credits. The advanced study of selected topics which will permit small groups of qualified students to work on subjects of mutual interest under the direction on an instructor. Courses may not be offered regularly; when offered courses will appear in the course schedule and will be 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.
Lecture 3 hours; 3 credits. Prerequisite: Instructor approval required. The advanced study of selected topics which will 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 will appear in the course schedule and will be 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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