2004

Virginia Commonwealth University Graduate and Professional Programs Bulletin Appendix A-Graduate and Professional Courses

Virginia Commonwealth University

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Virginia Commonwealth University
**Graduate School**

**GRAD 601 The Academic Profession**
Short course; 1 credit. This short course is designed to introduce graduate students to the roles and responsibilities of faculty members in institutions of higher education. Through readings, discussion, and conversations with faculty members from a variety of settings, students will learn about the changing social expectations for higher education, the diverse settings in which faculty work, and strategies for developing and presenting marketable academic skills.

**GRAD 602 Seminar in College Teaching**
Short course; 1 credit. This short course will focus specifically on the act of teaching. Graduate education in this country has only recently begun to address college teaching issues. While mastery of the discipline and of the research skills necessary to contribute to that discipline have long been a staple of graduate training, mastery of the knowledge and skills necessary for teaching the discipline are often neglected.

**GRAD 604 Seminar in Teaching the Professions**
Semester course; 1 lecture hour. 1 credit. Prerequisites: GRAD 601 and/or GRAD 602. Designed for students planning to enter careers as faculty in professional schools. Covers the pedagogical methods common to the professions but distinct from liberal arts disciplines. Topics include: teaching and learning professional expertise; teaching styles appropriate to clinical, field or studio settings; and evaluating students’ professional skills. Graded as "S," "U" or "F." Students must be within three years of receiving a terminal degree.

**GRAD 605 Professional Specialty Seminars**
Seminar course; 1 credit. Prerequisite: GRAD 604. These seminars will focus on the teaching profession itself and will be organized into four sections, one for each of the following professional clusters: fine arts (such as painting, sculpture, drama, music); applied social sciences (such as social work, education, business); applied physical sciences (such as engineering and environmental sciences); and health sciences (such as medicine, pharmacy, nursing). Unlike GRAD 604, which will focus almost exclusively on pedagogy in the professions, the GRAD 605 sections will include an emphasis on preparation for the full range of faculty responsibilities. Graded as "S," "U" or "F."

**GRAD 606 Internship/Externship in Professional Teaching**
Intern course; 1-3 credits. Prerequisites: GRAD 604 and GRAD 605. Students will gain experience and practice in clinical/field or studio instruction under the tutelage of a senior faculty mentor at a local institution, which most closely mirrors the institution type they would like to enter. Graded as "S," "U" or "F."
Center for Public Policy

Public Policy and Administration

PPAD 711 Seminar in Public Policy and Administration I
Semester course; 3 lecture hours. 3 credits. Doctoral students only. Provides a critical and comparative review of public policy and administration focusing on the empirical and theoretical literature in the field. Emphasizes the development of the policy studies field and its epistemological foundations. Includes alternative approaches to policy analysis, the place of analysis in the decision-making environment, and the role of policy in shaping administrative institutions.

PPAD 712 Seminar in Public Policy and Administration II
Semester course; 3 lecture hours. 3 credits. Prerequisite: PPAD 711. Doctoral students only. Examines the key intellectual paradigms in public administration and their historical development. Pays particular attention to the influence of institutional and organizational design on establishing and achieving public purposes; includes the role of administration in formulating and implementing public policy. Continuation of PPAD 711.

PPAD 713/PHIL 713 Ethics and Public Policy
Semester course; 3 lecture hours. 3 credits. Doctoral students only. An examination of the main theories of morality and justice. These theories' implications for public policy will be discussed.

PPAD 715 U.S. Political Processes and Institutions
Semester course; 3 lecture hours. 3 credits. This course examines the operation of the major national political institutions in the United States, the processes that help to define and shape those institutions, and the contexts in which these entities operate. The course familiarizes students with a broad range of scholarship and with the principal theoretical debates about U.S. politics.

PPAD 716 Public Policy Economics
Semester course; 3 lecture hours. 3 credits. This course is designed to introduce students to a set of applied micro-economic models that can be used to understand and evaluate important policy issues. Students will be shown how these models can be used as tools to design, to predict the effects of and to evaluate public policies. Specific models used in this course will include consumer theory, production theory, cost theory and the theory of economic organization. Discussions of policy analysis and evaluation will rely upon theoretical approaches to welfare economics.

PPAD 717 Law and Public Policy
Semester course; 3 lecture hours. 3 credits. An introduction to basic legal and constitutional issues that shape and limit the creation of public policy. An examination of court cases leads the student to examine the interaction between legislative policy makers, courts, and administrative implementers, and how the law may be used both to support the role of policy makers as well as to constrain them. Issues to be examined include health care, regulation of commerce, First Amendment issues, the environment, and educational policy.

PPAD 721 Survey of Applied Research Methods in Public Policy and Administration
Semester course; 3 lecture hours. 3 credits. Prerequisites: PADM 623 and PADM 624, or equivalent. Doctoral students only. Research design and its epistemological foundations. Includes quantitative and qualitative methods, including focus groups; probability and nonprobability sampling; mail, telephone and in-person interviewing; design of instruments; evaluation research, experiments and quasi-experiments; content analysis; observational and unobtrusive methods; cost-benefit and forecasting models; sources for secondary data analysis; and ethics of research.

PPAD 722 Survey of Data Analysis Techniques for Public Policy and Administration
Semester course; 3 lecture hours. 3 credits. Prerequisites: PADM 623, PADM 624 and PPAD 721, or equivalents. Doctoral students only. Levels of measurement and selection of appropriate analytical tools; creation of indexes and scales; reliability and validity of measures; univariate, bivariate and multivariate analysis; the nature of causality and statistical control; the elaboration of relationships and the logic of survey analysis; graphical presentation of data; and analysis of qualitative data. Focus will be kept on integrating data and analysis into decisions regarding research design. SPSS/PC computer software will be used to illustrate analysis techniques on General Social Survey (GSS) or other relevant data sets.

PPAD 723 Survey Research Methods
Semester course; 3 lecture hours. 3 credits. Overview of survey research methods with an emphasis on hands-on training in how to evaluate, conduct and analyze survey research.

PPAD 726 Advanced Research Design
Semester course; 3 lecture hours. 3 credits. Covers skills needed to develop independent research projects including all aspects of research design, measurement design, data analysis planning and interpretation, and report writing.

PPAD 730 Seminar in Health Policy
Semester course; 3 lecture hours. 3 credits. Examines key issues and alternative policy responses in health. Presents a framework for understanding health policy in terms of the regulatory environment, developing initiatives and emerging trends. Designed to assist students to build a program of research in health policy.

PPAD 740 Seminar in Public Management
Semester course; 3 lecture hours. 3 credits. Doctoral students only. Examines key theoretical and empirical literature in public sector administration with an emphasis on state and local government. Covers the management of human resource, financial and information systems. Includes the impact of leadership, organizational design and policy on the conduct of public activities. Designed to assist students to build a program of research in public management.

PPAD 750 Seminar in Urban Policy
Semester course; 3 lecture hours. 3 credits. Doctoral students only. Examines key issues in urban policy. Explores public policy as it relates to the natural, built, social, economic and political environments of urban life. Designed to assist students to build a program of research in urban policy.

PPAD 791 Topical Seminar
Semester course; 1-3 credits. May be repeated for a maximum of 6 credits. Prerequisites: Doctoral standing and permission of program director and instructor. An in-depth study of a selected topic in public affairs, policy or administration.

PPAD 792 Independent Study
Semester course; 1, 2 or 3 credits. May be repeated for a maximum of 6 credits. Prerequisites: Doctoral standing and permission of program director and instructor. Independent study and research in selected areas of public affairs, policy and administration under the guidance of a graduate faculty member.

PPAD 898 Dissertation Research
Semester course; 1-12 hours. May be repeated for credit. Prerequisite: Admittance to doctoral candidacy. Research on an approved dissertation subject.
Bioinformatics

**BNFO 505 Essentials of Statistics in Bioinformatics**
Semester course; 2 lecture hours. 2 credits. Prerequisites: CHEM 101 and 102, BIOL 218 and permission of instructor. Corequisite: CHEM 301 or permission of instructor. An intensive course designed for graduate students in either the biology/genomics or the computational science tracks of the bioinformatics program, aimed at providing the background in statistical concepts necessary for them to participate in graduate-level courses involving statistics. The course will focus on areas of particular interest in bioinformatics, including probability, combinatorics and linear models.

**BNFO 507 Essentials of Molecular Biology in Bioinformatics**
Semester course; 2 lecture hours. 2 credits. Prerequisites: CHEM 101 and 102, BIOL 218 and permission of instructor. Corequisite: CHEM 301 or permission of instructor. An intensive course designed for graduate students in either the bioinformatics-related area of interest and significance to students outside what is available through the courses and other options in the Bioinformatics Program. Graded as “S,” “U” or “F.”

**BNFO 508 Introduction to Bioinformatics Research**
Semester course; lectures and 4 laboratory hours. 3 credits. Prerequisite: Permission of instructor. Required of all first year students pursuing the thesis option (M.S.). Introduction to all active research programs in bioinformatics. Presentations of research programs by investigators and rotation of students through track-appropriate faculty labs to gain direct exposure to individual research projects. Graded as “S,” “U” or “F.”

**BNFO 591 Special Topics in Bioinformatics**
Semester course; variable lecture hours. 1-4 credits. Adviser’s approval is required for counting each special topics course toward meeting specific requirements of the master’s program. An introductory, detailed study of a selected topic in bioinformatics unavailable as an existing VCU course. If multiple topics are offered, students may elect to take more than one. Graded as “S,” “U” or “F.” Students will find specific topics and prerequisites for each special topics course listed in the Schedule of Classes.

**BNFO 592 Independent Study**
Semester course; variable lecture hours. Variable credits. Determination of the amount of credit and permission of instructor, adviser and curriculum committee must be obtained prior to registration for this course. Designed to provide an opportunity for independent study at an introductory graduate level in a bioinformatics-related area of interest and significance to students outside what is available through the courses and other options in the Bioinformatics Program. Graded as “S,” “U” or “F.”

**BNFO 601/BIOL 601 Integrated Bioinformatics**
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Presents major concepts in bioinformatics through a series of real-life problems to be solved by students. The problems addressed will include but not be limited to issues in genomic analysis, statistical analysis and modeling of complex biological phenomena. Emphasis will be placed on attaining a deep understanding of a few widely used tools of bioinformatics.

**BNFO 620 Bioinformatics Practicum**
Semester course; 3 lecture hours. 3 credits. Prerequisite: BNFO 601 or permission of instructor. Restricted to students pursuing the professional (M.Biof.) option. Practical application of bioinformatics to genomics, proteomics and pharmacogenomic analyses. Students will work in small groups to plan, develop and execute a project designed to solve practical challenges in the realm of bioinformatics. Proficiency in various aspects of bioinformatics will be developed.

**BNFO 650 Sequence Analysis in Biological Systems**
Semester course; 1 lecture and 2 laboratory hours. 3 credits. This course will treat the computational theory behind algorithms that are used for nucleic acid and protein sequence analysis. Students will be told specific topics and methodology of computational biology that has led to the development of current sequence analysis software. The objective of the course is to provide students with a basic knowledge of how current software tools have been developed and how they function, which will permit them to then apply this knowledge to the development of new algorithms and technology.

**BNFO 690 Seminars in Bioinformatics**
Semester course; 1 lecture hour. 1 credit. Presentation and discussion of research topics of current interest in the field of bioinformatics. Graded as “S,” “U” or “F.”

**BNFO 691 Special Topics in Bioinformatics**
Semester course; variable hours. 1-4 credits. Adviser’s approval is required for counting each special topics course toward meeting specific requirements of the master’s program. An advanced, detailed study of a selected topic in bioinformatics unavailable as an existing VCU course. If multiple topics are offered, students may elect to take more than one. Specific topics and prerequisites for each special topics course listed in the Schedule of Classes.

**BNFO 692 Independent Study**
Semester course; variable hours. Variable credit. Determination of the amount of credit and permission of the instructor, adviser and curriculum committee must be obtained prior to registration for this course. A course designed to provide an opportunity for independent study in a bioinformatics-related area of interest and significance to the student outside what is available through the courses and other options in the Bioinformatics Program. Graded as “S,” “U” or “F.”

**BNFO 697 Directed Research in Bioinformatics**
Semester course; variable hours. 3-9 credits. May be repeated for credit. Directed research leading to the M.S. degree in bioinformatics. Graded as “S,” “U” or “F.”

**BNFO 700 Externship in Bioinformatics**
Semester course; variable hours. 6 credits. Prerequisites: BNFO 601 and BNFO 620, or permission of instructor. Typically off-campus planned experiences for advanced graduate students designed to extend professional competencies, carried out in a professional setting under supervision of an approved professional. Externship activities monitored and evaluated by university faculty. Plan of experience designed by extern and external adviser with prior approval of department. An externship class will meet weekly using online technology to accommodate students doing out-of-town summer externships. Each externship will be a defined project leading to a required final report or product and offering real potential benefits to the sponsoring company/lab. Subsequent to the externship, a presentation to program faculty and students is required.

Environmental Studies

**ENVS 521/URSP 521/GEOG 521 Introduction to Geographic Information Science**
Semester course; 2 lecture and 2 laboratory hours. 3 credits. An introduction to creating and using geographically referenced databases for urban and environmental analysis and planning. Includes geographic and remote sensing data structures, global positioning systems, spatial analysis, geographic data standards, public domain software and data resources, and principles of cartography design. Lab exercises in the use of geographic information systems software tools.

**ENVS 550 Ecological Risk Assessment**
Semester course; 3 lecture hours. 3 credits. Prerequisites: Course work in ecology, statistics, geology, chemistry or permission of instructor. Ecological risk assessment provides an introduction to the concepts and practice of risk assessment as applied to ecological applications, focusing on the United States. The course will examine the history of risk assessment in the United States, environmental regulation and policy, development and practice of ecological risk assessment and application to regional issues. All students will conduct a risk assessment for a regional case study.

**ENVS 556/ANTH 556 Historical and Cultural Landscapes**
Semester course; 3 lecture hours. 3 credits. Open only to seniors who have completed ANTH 302 or 303 and graduate students with permission of instructor. Students will study historical and contemporary landscapes as the products of the producers of human culture, with particular attention to riverine landscapes. Focus will be on the ways in which humans shape and respond to their cultural landscapes, with particular attention to riverine landscapes. Students will participate in an active field research program, including the archaeological recovery and analysis of historical landscapes.

**ENVS 590 Research Seminar in Environmental Studies**
An interdisciplinary examination of problems and issues related to environmental studies.
ENVS 591 Topics in Environmental Studies
Variable hours. 1-3 credits per semester. May be repeated with different topics for a maximum of 6 credits. An in-depth study of a selected environmental topic. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

ENVS 601 Survey in Environmental Studies
Provides a foundational understanding of issues central to environmental studies. Lectures will address the theoretical and scientific basis for a variety of pertinent issues, including: and water quality and quantity, pollution prevention, environmental law and policy, population growth, global climate change, conservation, and human and ecological health.

ENVS 602 Environmental Technology
This course gives students the opportunity to develop skills not available in the traditional academic setting. Students take two to four workshops offered by the Center for Environmental Studies in its Environmental Technology Training Workshop series. Students will complete an additional project related to each workshop or series of workshops for evaluation purposes.

ENVS 603 Environmental Research Methods
Provides students with an understanding of statistical and research methods as they apply to environmental research. Students will complete projects on available data sets. This course emphasizes the application of current data analysis methodologies, including the graphical display of summary data, statistical modeling and prediction, and Geographic Information Systems (GIS).

ENVS 628/PADM 628 Environmental Policy and Administration
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. This course explores the relationship between environmental policy and its implementation within a democratic political system. It includes an investigation of basic concepts that underlie environmental policy and the difficulties encountered when attempting to apply them in a real-world setting. It also surveys a variety of tools and methodologies that may be useful in attempting to develop and implement environmental policy.

ENVS 650 Pesticides, Health and the Environment
Semester course; 3 lecture hours. 3 credits. Prerequisites: Course work in toxicology, chemistry or permission of instructor. This course is a look at the benefits and adverse effects of pesticides in the environment and as related to human health. The class provides an interdisciplinary study of pesticide use, fate, exposure, transport and effects.

ENVS 654/URSP 654/BIOL 654 Environmental Remote Sensing
Semester course; 3 lecture hours. 3 credits. Prerequisite: URSP/ENVS 521 or equivalent. This course provides a basic and applied understanding of the use of digital remote sensor data to detect, identify and characterize earth resources. Students are required to demonstrate an understanding of the spectral properties of soils, vegetation and water resources through various labs involving both image- and non-image-based optical spectral data.

ENVS 655 Hydrogeology
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENVS 355 or equivalent, or permission of instructor. Focuses on the fundamental concept of groundwater flow and contaminant transport with an emphasis toward environmental issues such as waste disposal, surface water hydrology, groundwater hydrology and wells, environmental impacts and hydrogeological systems. Allows students to understand and interpret the basic hydrogeologic characteristics of a site and to use that knowledge to provide an informed opinion on protection and remediation.

ENVS 660 Virginia Environmental Law
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENVS/PADM 628 or permission on instructor. An overview of relevant Virginia environmental law and regulations in the fields of environmental planning, management and policy. Provides students with working knowledge of documentation necessary for compliance with state environmental programs.

ENVS 670 Pollution Physiology
Semester course; 3 lecture hours. 3 credits. Prerequisites: Course work in: ecology, toxicology or animal physiology; or permission of instructor. This course provides an in-depth presentation of the physiology of animals in polluted habitats and examines the responses of aquatic organisms exposed to pollutants and other environmental stressors, including: thermal and salinity changes, anoxia and hypoxia, hypercapnia, chemical contamination, sedimentation and microbial contamination. The course takes a comparative approach and focuses on non-human systems. Both laboratory and field experiences are provided.

ENVS 691 Topics in Environmental Studies
Provides an in-depth study of a selected environmental topic.

ENVS 692 Independent Study
Variable hours. 1-3 credits per semester. May be repeated with different topics for a maximum of 6 credits. An in-depth study of a selected environmental topic.

ENVS 693 Internship in Environmental Studies
Each credit hour represents 60 clock hours of work. Provides students with a workplace experience in a public or private agency related to Environmental Studies.

ENVS 697 Research
Planning, preparation, completion, and presentation of research in environmental studies.

ENVS 698 Thesis
Planning, preparation, completion, and presentation of research in environmental studies.

Life Sciences

LFSC 510/BIOL 545 Biological Complexity
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: BIOL 310 and 317, CHEM 302, PHYS 202, MATH 200 or equivalents or permission of the instructor. Opened to qualified seniors and graduate students only. An introduction to the basis of complexity theory and the principles of emergent properties within the context of integrative life sciences. The dynamic interactions among biological, physical and social components of systems are emphasized, ranging from the molecular to ecosystem level. Modeling and simulation methods for investigating biological complexity are illustrated.

LFSC 520/BIOL 548 Bioinformatic Technologies
Semester course; 2 lecture hours. 2 credits. Prerequisite: BIOL 545/LFSC 510 or permission of instructor. Introduction to the hardware and software used in computational biology, proteomics, genomics, ecoinformatics and other areas of data analysis in the life sciences. The course also will introduce students to data mining, the use of databases, meta-data analysis and techniques to access information.

LFSC 591 Special Topics in Integrative Life Sciences
Semester course; variable hours. 1-4 credits. A 500-level study of a selected topic in integrative life sciences. Students will find specific topics and prerequisites for each Special Topics course listed in the Schedule of Classes. If multiple topics are offered, students may elect to take more than one.

LFSC 610 Analytical Methods in Biocomplexity Analysis
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: LFSC 510 or equivalent, or permission of the instructor. An introduction to mathematical and computational methods in biocomplexity analysis and the mathematical and computational simulation of biological systems. Topics include methods for dynamical systems analysis, nonlinear systems analysis, gene sequencing, fractals and chaos, and pattern recognition. Students will be exposed to Maple, Matlab, SPSS, E-Cell, BioPerl, Epigram, and C.

LFSC 629 Integrative Life Sciences Research
Semester course; 2 lecture hours. 2 credits. An introduction to integrative research in the life sciences from the molecular to ecosystem level. The course will include presentations on ongoing interdisciplinary integrative life-oriented life sciences research by faculty members and discussion and analysis of classic interdisciplinary research projects.

LFSC 630 Integrative Life Sciences
Semester course; 2 lecture hours. 2 credits. An introduction to integrative research in the life sciences from the molecular to ecosystem level. The course will include presentations on ongoing interdisciplinary integrative life-oriented life sciences research by faculty members and discussion and analysis of classic interdisciplinary research projects.

LFSC 690 Research Seminar in Integrative Life Sciences
Semester course; 1 lecture hour. 1 credit. May be repeated for credit. Presentation and discussion of research topics of current interest in the life sciences. Graded as “S,” “U” or “F.”

LFSC 691 Special Topics in Integrative Life Sciences
Semester course; variable hours. 1-4 credits. Prerequisite: Permission of instructor required. Advanced graduate study of a selected topic in integrative life sciences. Students will find specific topics and prerequisites for each Special Topics course listed in the Schedule of Classes. If multiple topics are offered, students may elect to take more than one.

LFSC 697 Directed Research in Integrative Life Sciences
Semester course; variable lecture/laboratory hours. 1-15 credits. May be repeated for credit. Directed research leading to the Ph.D. degree in Integrative Life Sciences.
**Anthropology**

**ANTH 551 Anthropology for the Museologist**
Semester course; 3 lecture hours. 3 credits. A discussion and investigation of contemporary anthropological themes and questions and identification of how they can be depicted with museum materials. Students are expected to develop a research design for an exhibit.

**ANTH 556/ENVS 556 Historical and Cultural Landscapes**
Semester course; 3 lecture hours. 3 credits. Open only to seniors who have completed ANTH 302 or 303 and graduate students with permission of instructor. Students will study historical and contemporary landscapes as the products of the producers of human culture, with particular attention to riverine landscapes. Focus will be on the ways in which humans shape and respond to their ecosystems. Students will participate in an active field research program, including the archaeological recovery and analysis of historical landscapes.

**Biology**

**BIOL 206/PHIS 206 Human Physiology**
Semester course; 3 lecture hours. 3 credits. Prerequisites: A “C” grade or better in BIOL 101 and BIOZ 101L or equivalent. Functioning of the human body with emphasis on experimental procedures. Not applicable for credit toward the B.S. in Biology.

**BIOL 206L/PHIZ 206L Human Physiology Laboratory**
Semester course; 2 laboratory hours, 1 credit. Pre- or corequisite: BIOL/PHIS 206. Functioning of the human body with emphasis on experimental procedures. Not applicable for credit toward the B.S. in Biology.

**BIOL 502/MICR 502 Microbial Biotechnology**
Semester course; 3 lecture hours. 3 credits. Prerequisites: MICR/BIOC 503 or equivalent, and MICR/BIOC 504 or equivalent. Open to qualified seniors and graduate students only. Discussion of the application of basic principles to the solution of commercial problems. The course will cover the historical principles in biotransformations as related to primary and secondary metabolism, as well as recombinant DNA technology and monoclonal antibodies and products resulting from the application of recombinant DNA technology.

**BIOL 503 Fish Biology**
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: BIOL 317 or equivalent. Open to qualified seniors and graduate students only. Classification, behavior, physiology and ecology of fishes. Laboratories will emphasize field collection of fishes and laboratory identification with specific emphasis on applied techniques for the fisheries biologist.

**BIOL 504 Comparative Animal Physiology**
Semester course; 3 lecture and 4 laboratory hours. 4 credits. Prerequisites: BIOL 218 and CHEM 301-302 and CHEZ 301L, 302L. Open to qualified seniors and graduate students only. Classification, behavior, physiology and ecology of fishes. Laboratories will emphasize field collection of fishes and laboratory identification with specific emphasis on fish biology.

**BIOL 507 Aquatic Microbiology**
Semester course; 2 lecture and 4 laboratory hours. 4 credits. Prerequisites: BIOL 303 and BIOL 307 or equivalents. Open to qualified seniors and graduate students only. This course will involve a practical approach to the methods used to culture and enumerate specific microorganisms that affect the cycling of elements in aquatic systems and those that affect or indicate water quality.

**BIOL 508 Barrier Island Ecology**
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 317 or equivalent, or permission of instructor. A study of the physical factors affecting the formation of barrier islands, adaptations of plants and animals for colonization and persistence in these harsh environments, and how coastal ecological processes conform to general ecological theory. Examples and problems pertaining to Virginia and the southeastern United States are emphasized.

**BIOL 510 Conservation Biology**
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 310 and BIOL 317 (or equivalents) or permission of instructor. Open to qualified seniors and graduate students only. Explores the accelerated loss of species due to increasing human population pressure and the biological, social and legal processes involved in conserving biodiversity.

**BIOL 512 Plant Diversity and Evolution**
Semester course; 3 lecture and 4 laboratory hours. 4 credits. Prerequisites: BIOL 219 and 310 or equivalents, or permission of instructor. Taxonomy, diversity and evolutionary history of vascular plants (including ferns, gymnosperms and flowering plants). Lecture emphasis on evolutionary relationships; laboratory emphasis on plant recognition and identification, especially of the Virginia flora. Including some field trips to areas of local botanical interest.

**BIOL 514 Stream Ecology**
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: BIOL 317. Open to qualified seniors and graduate students only. Ecology of streams and rivers. Laboratory emphasis is on the structure and functioning of aquatic communities in mountain to coastal streams.

**BIOL 516/HGEN 516 Population Genetics**
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 510 or equivalent. Emphasizes a broad approach, at an advanced level, to human genetics. Explores topics including cytogenetics, pedigree analysis, gene mapping, aneuploid syndromes, inborn error of metabolism, neonatal screening, cancer, genetic engineering, behavior and intelligence, prenatal diagnosis and genetic counseling.

**BIOL 524 Endocrinology**
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 310 and CHEM 301-302 and CHEZ 301L, 302L or equivalent. Open to qualified seniors and graduate students only. Theoretical and empirical analysis of the structure and function of natural communities, ecosystems and landscapes.

**BIOL 522 Evolution and Speciation**
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 310 or equivalent. Open to qualified seniors and graduate students only. Evolutionary principles, with emphasis on genetic and environmental factors leading to changes in large and small populations of plants and animals, and the mechanisms responsible for speciation.

**BIOL 524 Endocrinology**
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 310 and CHEM 301-302 and CHEZ 301L, 302L or equivalent. Open to qualified seniors and graduate students only. Theoretical and empirical analysis of the structure and function of natural communities, ecosystems and landscapes.

**BIOL 520 Population Ecology**
Semester course; 3 lecture and 2 laboratory hours. One three-day field trip is required. Prerequisite: BIOL 310 or equivalent. Open to qualified seniors and graduate students only. Theoretical and empirical analysis of processes that occur within natural populations, including population genetics, population growth and fluctuation, demography, evolution and interspecific interactions. Quantitative models will be used extensively to explore ecological concepts.

**BIOL 521 Community Ecology**
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 317 or equivalent. Open to qualified seniors and graduate students only. Theoretical and empirical analysis of the structure and function of natural communities, ecosystems and landscapes.

**BIOL 522 Evolution and Speciation**
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 310 or equivalent. Open to qualified seniors and graduate students only. Evolutionary principles, with emphasis on genetic and environmental factors leading to changes in large and small populations of plants and animals, and the mechanisms responsible for speciation.

**BIOL 530/HGEN 501 Human Genetics**
Semester course; 3 credits. Prerequisites: BIOL 310 and CHEM 301-302 and CHEZ 301L, 302L or equivalents. Open to qualified seniors and graduate students only. Emphasizes a broad approach, at an advanced level, to human genetics. Explores topics including cytogenetics, pedigree analysis, gene mapping, aneuploid syndromes, inborn error of metabolism, neonatal screening, cancer, genetic engineering, behavior and intelligence, prenatal diagnosis and genetic counseling.

**BIOL 532 Water Pollution Biology**
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 317 or equivalent and one year of general chemistry. A study of various forms of pollution in aquatic environments, including the basic principles and effects of water pollution on aquatic organisms and ecosystems, ecotoxicology, waterborne pathogens, invasive species, water pollution monitoring and environmental laws.

**BIOL 540 Fundamentals of Molecular Genetics**
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 310 or consent of instructor. The basic principles and methodologies of molecular biology and genetics are applied to genome organization, replication, expression, regulation, mutation and recombination. Emphasis will be placed on a broad introduction to and integration of important topics in prokaryotic and eukaryotic systems.

**BIOL 541 Laboratory in Molecular Genetics**
Semester course; 1 lecture and 4 laboratory hours. 2 credits. Pre or corequisite: BIOL 540 Fundamentals of Molecular Genetics or equivalent. Experiments are designed to apply advanced techniques and concepts of molecular biology and genetics using...
prokaryotic and eukaryotic systems. Emphasis will be placed on experimental design, integrating results throughout the semester, making use of published literature, scientific writing and providing hands-on experience with advanced equipment and methodologies.

**BIOL 545/LFSC 510 Biological Complexity**  
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: BIOL 310 and 317, CHEM 302, PHYS 202, MATH 200 or equivalents or permission of the instructor. Opened to qualified seniors and graduate students only. An introduction to the basis of complexity theory and the principles of emergent properties within the context of integrative life sciences. The dynamic interactions among biological, physical and social components of systems are emphasized, ranging from the molecular to ecosystem levels. Modeling and simulation methods for investigating biological complexity are illustrated.

**BIOL 548/LFSC 520 Bioinformatic Technologies**  
Semester course; 2 lecture hours. 2 credits. Prerequisite: BIOL 454/LFSC 410 or permission of instructor. Introduction to the hardware and software used in computational biology, proteomics, genomics, ecoinformatics and other areas of data analysis in the life sciences. The course also will introduce students to data mining, the use of databases, meta-data analysis and techniques to access information.

**BIOL 550 Ecological Genetics**  
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: BIOL 410/LFSC 410 and BIOL 317 (or equivalents) or permission of instructor. Open to qualified seniors and graduate students only. Introduces the principles of ecological genetics, especially those with foundations in population and quantitative genetics, and illustrates conceptual difficulties encountered by resource stewards who wish to apply genetic principles. Explores various types of biological technologies employed by conservation geneticists and provides means for students to gain experience in analyzing and interpreting ecological genetic data.

**BIOL 565 Advances in Cell Signaling**  
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 218 or equivalent. Topical course focusing on advances in cellular communication by cytokines, hormones and neurotransmitters. Each semester, the course focuses on a different topic. Past topics have included cancer biology, allergy and asthma, and autoimmunity.

**BIOL 580 Eukaryotic Biotechnology**  
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 310 and BIOL 310L, or graduate standing in biology or related fields. Open to qualified seniors and graduate students only. Discussion of principles, concepts and applications of current advances in cellular and molecular biology aspects of biotechnology for animal and plant cells. The course will cover molecular construction; DNA cloning; technologies for DNA, RNA and protein analyses; nonvector and vector-mediated genetic transformation; gene regulation in transgenic plants; cell and tissue culture; cell fusion; and agricultural, medical and other industrial applications.

**BIOL 585 Virology**  
Semester course; 3 lecture hours. 3 credits. Prerequisites: 16 credits in biology; a “C” grade or better in BIOL 218 or equivalent; eight credits in chemistry. Open to qualified seniors and graduate students only. A comprehensive introduction to virology encompassing viruses of vertebrates, invertebrates, plants and bacteria. Topics include physical and chemical characterization, classification, detection, replication, genetics, diseases, immunology, epidemiology and characterization of neurotropic disorders of infants and children. Critically surveys current theory and practice in neumorotrophic therapeutics for children and adults.

**BIOL 591 Special Topics in Biology**  
Semester course; 1-4 credits. An in-depth study of a selected topic in biology. See the Schedule of Classes for specific topics to be offered each semester and prerequisites. If several topics are offered, students may elect to take more than one.

**BIOL 606 Quantitative Ecology**  
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 501 and STAT 543 or equivalent. Principles and applications of mathematical ecology at the community level, including experimental design; sampling techniques, assumptions and limitations; and the use of cluster analysis, gradient analysis and ordination to evaluate, summarize and compare large data sets.

**BIOL 626 Physiological Ecology**  
Semester course; 4 lecture hours. 4 credits. Prerequisite: BIOL 317 or equivalent. This course examines the physiological adaptations and adjustments made by organisms in response to their environment.

**BIOL 630 Patterns of Mammalian Reproduction**  
Semester course; 3 lecture hours. 3 credits. A comprehensive ecological and evolutionary study of specialization and adaptive radiation in mammalian reproductive anatomy, the reproductive cycle, seasonality of reproduction and factors affecting litter size and developmental stage of neonates. Human reproductive biology is included when pertinent.

**BIOL 654/ENVX 654/URSP 654 Environmental Remote Sensing**  
Semester course; 3 lecture hours. 3 credits. Prerequisite: URSP/ENVX 521 or equivalent. This course provides a basic and applied understanding on the use of digital remote sensor data to detect, identify and characterize earth resources. Students are required to demonstrate an understanding of the spectral attributes of soils, vegetation and water resources through various labs involving both image- and non-image-based optical spectral data.

**BIOL 675 Physiology of the Cell**  
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: CHEM 301-302, CHEZ 301L, 320L and at least one of the following biology courses: BIOL 302, 303, 311 or their equivalents. Physiological principles of cellular function in bacterial, plant, and animal cells. The laboratory will stress investigative techniques.

**BIOL 690 Biology Seminar**  
Semester course; 1 credit. May be repeated for credit. Presentations by faculty and visiting lecturers, and discussions of research and developments in biology and related fields. Graded as “S,” “U” or “F.”

**BIOL 691 Special Topics in Biology**  
Semester course; variable hours. 1-4 credits. An advanced study of a selected topic in biology. See the Schedule of Classes for specific topics to be offered each semester and prerequisites. If several topics are offered, students may elect to take more than one.

**BIOL 692 Independent Study**  
Semester course; hours to be arranged. Credits to be arranged. Determination of the amount of credit and permission of instructor, adviser and department chair must be obtained prior to registration for this course. A course designed to provide an opportunity for independent research in any area of biology outside the graduate student thesis area.

**BIOL 693 Current Topics in Biology**  
Semester course; 1 lecture hour. 1 credit. May be repeated for credit. Designed to develop skills in preparing and delivering oral presentations in conjunction with an in-depth study of a current topic in biology. Students present talks and lead discussions on the selected topic. Graded as “S,” “U” or “F.”

**BIOL 698 Thesis**  
Semester course; hours to be arranged. Credits to be arranged. Independent research by students in areas of systems, environmental, developmental, behavioral, cellular and molecular biology, and comparative physiology.

**Chemistry**

**CHEM 310/MEDC 310 Medicinal Chemistry and Drug Design**  
Semester course; 3 lecture hours. 3 credits. Prerequisite: One year of organic chemistry. This course is designed to expose undergraduate chemistry, biology and pre-medicine majors to the history, theory and practice of medicinal chemistry. The course will emphasize a combination of fundamentals and applications of drug design. In particular, the molecular aspects of drug action will be discussed. Special emphasis will also be placed on the methods used by medicinal chemists to design new drugs.

**CHEM 504 Advanced Organic Chemistry I**  
Semester course; 3 lecture hours. 3 credits. An integrated study of certain free radical and ionic reaction mechanisms with emphasis on electronic effects and stereochemoconsequences of these reactions.

**CHEM 506 Introduction to Spectroscopic Methods in Organic Chemistry**  
Half-semester course; 3 lecture hours. 1.5 credits. Introduction to mass spectrometry, infrared and 1D 1H and 13C NMR spectroscopy, theory and practice in the elucidation of organic structures.

**CHEM 507 Introduction to Natural Products**  
Semester course; 3 lecture hours. 3 credits. A study of the biosynthetic origins, isolation, structure elucidation, and uses of naturally occuring organic compounds. Emphasis is placed upon three major classes of
CHEM 510 Atomic and Molecular Structure
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301 and PHYS 208. Survey of the pertinent aspects of quantum mechanics. Line spectra, atomic structure and molecular bonding.

CHEM 511 Chemical Thermodynamics and Kinetics
Semester course; 3 lecture hours. 3 credits. The concepts and principles of thermodynamics and their application to chemical problems. The rates and mechanisms of chemical reactions including collision and transition state theories.

CHEM 532 Advanced Analytical Chemistry
Semester course; 3 lecture hours. 3 credits. Theories and principles of thermodynamics and kinetics relevant to analytical methods, including acid-base, redox, and metal complexion, nonaqueous systems, kinetics, and an introduction to surface chemistry.

CHEM 550 Introduction to Polymer Chemistry
Semester course; 3 lecture hours. 3 credits. A study of macromolecular compounds that includes classification, methods of preparation, mechanisms, stereochemistry, and applications. Physical characterizations, such as structure and property correlations, kinetics, thermodynamics, and molecular weight determinations are emphasized.

CHEM 580 Mechanical Properties of Plastics and Polymers
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate standing or permission. This course provides a link between the more practical aspects of plastics and the fundamental properties of the polymers from which they are made. Topics covered deal with the structure of polymers with emphasis on relationships with mechanical properties; rubber elasticity; the glass transition and other secondary transitions; time and temperature dependency; yield and fracture; crystallization and morphology; influence of polymer processing on mechanical properties.

CHEM 591 Topics in Chemistry
Semester course; variable hours. 1-6 credits per semester. Maximum total of 9 credits for all topics courses. An in-depth study of a selected topic in chemistry. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

CHEM 604 Advanced Organic Chemistry II
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 603 or permission of instructor. Advanced topics in functional group protection and control of stereochemistry. Focus on current techniques, instrumentation, and applications.

CHEM 606 Advanced Spectroscopic Methods in Organic Chemistry
Half-semester course; 3 lecture hours. 1.5 credits. Prerequisite: CHEM 506 or permission of instructor. Advanced spectroscopic techniques including 2D, multinuclear and solid state NMR; theory and practice in the education of organic structures.

CHEM 607 Organic Synthesis of Natural Products
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 604 or permission of instructor. A study of the criteria for, applications of reactions to, and design of, complex organic syntheses, including functional group protection and control of stereochemistry.

CHEM 610 Applied Quantum Chemistry
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 510. Quantum mechanics applied to chemical problems in UV, IR, and NMR spectroscopy and the electronic structures of atoms and molecules; development of the self-consistent field equations.

CHEM 611 Molecular Spectroscopy
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 510. This course teaches the interaction of radiation and molecules; the rotation, vibration, and electronic motion of molecules; molecular spectra and recent developments in laser spectroscopy.

CHEM 612 Statistical Thermodynamics
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 510 or PHYS 580. The principles of quantum and classical statistical thermodynamics with application to selected chemical and physical systems.

CHEM 615 Chemical Thermodynamics
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 510. The study of the laws of thermodynamics and their application to pure phases, solutions, and changes in state.

CHEM 616 Chemical Kinetics
Semester course; 3 lecture hours. 3 credits. A study of the rates and mechanisms of chemical reactions, reaction rate theory, kinetic theory of gases, and theories of catalysis.

CHEM 620 Advanced Inorganic Chemistry I
Semester course; 3 lecture hours. 3 credits. The application of modern physical techniques for the determination of the symmetry, molecular structure, bonding, and reaction mechanisms of inorganic compounds.

CHEM 621 Advanced Inorganic Chemistry II
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 620 or permission of instructor. A coordinated study of synthetic methods, stereochemistry, and reaction mechanisms including catalysis of inorganic, organonmetallic and biomimetic compounds.

CHEM 630 Electroanalytical Chemistry
Semester course; 3 lecture hours. 1.5 credits per module. Maximum of two modules per semester. Prerequisite: CHEM 532 or permission of instructor. Presents the theory and applications of electroanalytical techniques including cyclic voltammetry, potential step methods, microelectrode voltammetry and spectroelectrochemistry.

CHEM 631 Separation Science
Modular course; 3 lecture hours. 1.5 credits per module. Maximum of two modules per semester. Prerequisite: CHEM 532 or permission of instructor. Discussion of theories and principles of separation science as applied to chemical problems with emphasis on current techniques, instrumentation, and applications.

CHEM 632 Chemometrics
Modular course; 3 lecture hours. 1.5 credits per module. Maximum of two modules per semester. Prerequisite: CHEM 409 or permission of the instructor. Computer methods for experimental design and data analysis of spectroscopic, electrochemical and chromatograph data. Topics include sampling theory, detection limits, curve resolution, Fourier transform-based instruments, and factor analysis.

CHEM 633 Mass Spectrometry
Modular course; 3 lecture hours. 1.5 credits per module. Maximum of two modules per semester. Prerequisite: CHEM 532 or permission of the instructor. Topics include mass spectrometry ionization methods, mass analyzers, theory of unimolecular decompositions, and techniques used for ion structure determination.

CHEM 634 Surface Science
Modular course; 3 lecture hours. 1.5 credits per module. Maximum of two modules per semester. Prerequisite: CHEM 532 and 633 or permission of the instructor. Topics include types of surfaces requiring surface analysis, electron-surface scattering (AES, UPS, XPS, HREELS, LEED, STM, SEM), photon-surface scattering (IR, NMR, EXAFS), Molecule/Ion-Surface scattering (ISS, RMBS), chemisorption techniques and work function measurements.

CHEM 635 Spectrochemical Analysis
Modular course; 3 lecture hours. 1.5 credits per module. Maximum of two modules per semester. Prerequisite: CHEM 532 or permission of instructor. Topics include instrumental components, such as lasers, photomultipliers, array detectors, monochromators, lock-in and boxcar detection, waveguides and optical fibers, atomic spectroscopic methods, fluorescence, Raman and circular dichroism spectroscopies.

CHEM 690 Research Seminar
Semester course; 1 credit. May be repeated for credit. In addition to reports presented by students, staff, and visiting lecturers, current problems and developments in chemistry are discussed.

CHEM 691 Topics in Chemistry
Semester course; variable hours. 1-6 credits per semester. Maximum total of 9 credits for all topics courses. An advanced study of selected topic(s) in chemistry. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

CHEM 697 Directed Research
Semester course; 1-15 credits. May be repeated for credit. Research leading to the M.S. and Ph.D. degree.

Criminal Justice

CRJS 501 Criminal Justice Assessment
Semester course; 3 lecture hours. 3 credits. Survey of the American criminal justice system, and the relationships among crime,
law, police, courts, and corrections. Review of contemporary criminal justice literature.

CRJS 550 Professional Ethics and Liability
3 credits. The ethical basis for decision making in criminal justice. How ethical considerations affect every important decision in criminal justice, especially as they involve the liberty interests of others. These decisions include: police stop and arrest decisions, prosecutor charging decision, defendant plea decision, sentencing decisions, judicial evidentiary rulings, sentencing decisions, among others. The consequences of unethical decisions on management ability, civil and criminal liability faced by criminal justice professionals.

CRJS 571/FRSC 571 Survey of Forensic Science
Semester course; 3 lecture hours. 3 credits. History and current status of forensic science as they relate to the crime laboratory, law, biology, and chemistry. Review of specialties within the field, analytical techniques employed, and career opportunities in the field.

CRJS 591 Topic Seminar
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for a maximum of 6 credits. Periodic seminar in contemporary criminal justice topics. Topics to be determined.

CRJS 601 Research Basis of Criminal Justice
Semester course; 3 lecture hours. 3 credits. Examines principles of design, method, and analysis in criminal justice research. Issues of reliability, validity, and the applicability of research findings in practice.

CRJS 612 Criminal Justice Politics and Planning
Semester course; 3 lecture hours. 3 credits. Assesses political and public policy issues as they relate to the administration of justice planning and policy strategies. Emphasizes planning implications of interagency relationships, the impact of social change in the criminal justice process, and community involvement in the control and prevention of crime.

CRJS 616 Justice Policy and Administration
Semester course; 3 lecture hours. 3 credits. Analyses the legal, philosophical, political, and management influences that shape the criminal justice policy and its administration. Organization and management principles as they apply to the justice system with emphasis on leadership and human resource development.

CRJS 620/SOCY 620 Seminar in Criminology
Semester course; 3 lecture hours. 3 credits. Examination and analysis of social, psychological, and economic theories and correlates of criminal behavior. Typologies of offenders.

CRJS 622 Comparative Criminal Justice Systems
Semester course; 3 lecture hours. 3 credits. Study of crime, law, and criminal justice from an international perspective, emphasizing their comparative aspects.

CRJS 631 Administrative Issues in Criminal Justice
Semester course; 3 lecture hours. 3 credits. Application of organizational theory and administrative behavior to criminal justice policy, management, and operation. Administrative concepts, program planning and development, and innovative management practices.

CRJS 641 Jurisprudence
Semester course; 3 lecture hours. 3 credits. Examines the theoretical underpinnings of law and justice. Studies the evolution of theories of jurisprudence within the context of evolving concepts of responsibility and law. Systems of law will be contrasted and emphasis will be placed on contemporary developments in substantive laws.

CRJS 660 Seminar in Legal Process
Semester course; 3 lecture hours. 3 credits. Studies the formal and informal procedures of various criminal justice systems. Advanced study of criminal procedure and the major legal constraints and authorizations placed upon arrest, prosecution, trial, sentencing and appeal.

CRJS 670/FRSC 670 Forensic Evidence and Criminal Procedure
Semester course; 3 lecture hours. 3 credits. Presents the law of criminal procedure and rules of evidence as applied to forensic science. Examines issues of scientific versus legal burdens of proof, legal terminology, and trial procedure.

CRJS 680/FRSC 680 Forensic Psychiatry
Semester course; 3 lecture hours. 3 credits. Guilty mind requirements in criminal law. Competency to stand trial, insanity defense, mental disorder and crime. Behavioral profiling of serial murders and sex offenders. Issues in the use of clinical and statistical prediction methods in criminal justice.

CRJS 684 Comprehensive Exam Writing
Semester course; 3 credits with 1 credit extension. May be taken anytime after completion of the required core courses. Students will write a multimention comprehensive exam over a period of 10 weeks. Students may be asked to orally explain and respond to questions on the written answers to the comprehensive exam. Graded as pass/fail.

CRJS 692 Directed Independent Study
Semester course; 1-3 credits. May be repeated for a maximum of 6 credits. The instructor's review and approval of the study proposal must precede independent work by student. Provides an opportunity for an advanced student to pursue an independent research project or extensive literature review under the supervision of an instructor.

CRJS 693 Internship
Semester course; 3 credits. Students must apply for this internship a semester in advance. Provides student an opportunity to relate theory to practice through observation and experience in an approved agency. The internship should be taken near the end of the degree program. Graded as pass/fail.

CRJS 763 Seminar in Social Justice
Semester course; 3 lecture hours. 3 credits. Examines the historical underpinnings of the principles of justice and their relationship to equality, liberty, government, and law.

CRJS 798 Thesis Research
Semester course; 3 credits with 1 credit extension. May be repeated for credit. Prerequisite: CRJS 601; a graduate statistics course is strongly recommended. Permission of graduate instructor. Registration for this course is permitted only upon approval of the candidate's detailed research proposal and statement of qualifications reviewed a semester in advance by a faculty committee. A two-semester project resulting in an advanced research paper that involves a comprehensive literature review, approved research design, and an original analysis or replication study. CRJS 798 involves preparation and oral defense of the thesis prospectus. Graded as "S," "U," or "F."

CRJS 799 Thesis
Semester course; 1-3 credits. Prerequisite: Completion of CRJS 798. Execution of the research prospectus approved in CRJS 798. The master's thesis will be written according to University guidelines, approved by the student's faculty committee, and defended orally before the faculty committee. Graded as "S," "U," or "F."

English

ENGL 500 Practicum in College English
Semester course; 1-6 credits. May be repeated for credit. May not be applied toward degrees in English. Prerequisite: Permission of director of graduate studies. Student participation in planned educational experience under the supervision of English department faculty. The practicum may include classroom teaching, Writing Center tutoring, or participation in research projects.

ENGL 501 Introduction to Graduate Studies in English
Semester course; 1 lecture hour. 1 credit. Required of all new graduate students seeking the M.A. in English. An introduction to the theoretical and practical aspects of advanced English studies.

ENGL 528/TEDU 528 Children's Literature II
Semester course; 3 lecture hours. 3 credits. A study of classic and current children's books from a variety of literary genre. Magazines and media-related reference resources and journals are reviewed. The creative use of literature, its sociocultural functions, and its contribution to the development of the oral and written expression of children from nursery to grade eight are explored. A focus on children with special problems is included. May not be taken for credit toward undergraduate English major if student has taken ENGL/TEDU 351. May not be used to fulfill literature requirement for M.A. in English or M.F.A. in Creative Writing, but may be taken as elective credit.

ENGL 530 Introduction to Scholarship in English Studies
Semester course; 3 lecture hours. 3 credits. Introduces the practice of research and scholarly discourse in English studies. Emphasizes scholarly resources (print and electronic) and textual studies.

ENGL 531 Literary Criticism
Semester course; 3 lecture hours. 3 credits. A study of the fundamental concepts involved in the practice of criticism. Some attention is given to the historical development of criticism, but the primary focus is on its methods and aims.

ENGL 532/ENED 532 Applied English Linguistics
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisite: ENGL 449 or equivalent course in linguistics or permission of instructor. Application of
linguistics theories and methods to selected teaching problems, such as teaching English grammar and usage, teaching English as a second or foreign language, or teaching standard English to students who speak different dialects.

**ENGL 552/TEDU 552/LING 552 Teaching English as a Second Language**
Semester course; 3 lecture hours. 3 credits.
Provides students who plan to teach English to people whose native language is not English with a variety of instructional/learning strategies. Presents and explores current approaches and methodology, as these relate to linguistic features and pedagogy.

**ENGL 553 Studies in Linguistics**
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisite: ENGL 449 or equivalent course in linguistics or permission of instructor. A general introduction to one area of linguistic study, such as pronunciation, grammar, stylistics, dialects, usage standards, lexicography, onomastics, or semantics.

**ENGL 561 Medieval Literature**
Semester course; 3 lecture hours. 3 credits. A survey of major works of British literature in the Middle Ages with some attention to continental influences upon both Old English and Middle English works. The study will include works of the period from Beowulf to Morte d'Arthur. Some reading in modern English translation, some in Middle English.

**ENGL 563 Renaissance Literature**
Semester course; 3 lecture hours. 3 credits. A survey of British poetry, prose, and drama written in the 16th and 17th centuries. Attention will be divided among major figures - such as More, Marlowe, Spenser, Shakespeare, Donne, Johnson, Milton, and minor authors.

**ENGL 565 Restoration and 18th-century Literature**
Semester course; 3 lecture hours. 3 credits. A survey of Restoration and 18th-century poetry, drama, fiction, and prose. Readings in major figures of the period including Behn, Dryden, Etherege, Congreve, Steele, Defoe, Swift, Pope, Montagu, Richardson, Fielding, Johnson, Sheridan, and Austen.

**ENGL 567 Romantic and Victorian British Literature**
Semester course; 3 lecture hours. 3 credits. A survey of British literature during the 19th-century. Readings in the major writers, especially poets and novelists such as Wordsworth, Shelley, Dickens, the Brownings, the Brontes, Eliot and Hardy.

**ENGL 569 20th-century British Literature**
Semester course; 3 lecture hours. 3 credits. A survey of the literature of 20th-century Britain and Ireland. Major figures of the early part of the century such as Conrad, Lawrence, Woolf, Joyce, Mark, Shaw, Auden will be complemented by the emerging writers of the second half of the century.

**ENGL 571 American Literature I**
Semester course; 3 lecture hours. 3 credits. A survey of the literature of the United States from the Puritan period through the Romantic period.

**ENGL 572 American Literature II**
Semester course; 3 lecture hours. 3 credits. A survey of the literature of the United States from the Age of Realism through the Contemporary period.

**ENGL 601/ENED 601 Young Adult Literature**
Semester course; 3 lecture hours. 3 credits. Examination of literature written for young adults, literature created for young people in middle schools and high schools. Focuses on the content, characteristics, and teaching of such literature.

**ENGL 611 The Writer in His Own Time**
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A study of the biographical, intellectual, and sociological influences on a selected British or American writer and his work. The course is designed to discover how the external factors of a writer's life are absorbed and transmuted into art by drawing upon the resources of other disciplines when relevant.

**ENGL 614 Major Works of Literature**
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A study of the aesthetic backgrounds, composition, and continuing interpretation of a selected work of English or American literature generally regarded as classic. The intent of the course is to comprehend as fully as possible the literary work of art through studying the aesthetic influences upon it and by applying various critical approaches to it.

**ENGL 617 Major Literary Modes**
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A study through the analysis of selected literary works of several genres, of modes that are useful to understand and judge literature. The study may draw upon the literature of many nations in English translation. The following modes are examples of those that may be studied: the heroic mode, the tragic mode, the comic mode, the ironic mode.

**ENGL 620 Patterns in Literary Thought**
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A study of significant recurring intellectual attitudes and concepts that have found expression in literature and thought. The development of literary style and thought. The study will draw upon the literature of many nations in English translation.

**ENGL 624 Literature in Society**
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A study of the ways in which literature often reflects, supports, and influences political and philosophical movements in society. Creative literature, primarily English and American, will be studied in terms of its response to or effect upon social issues.

**ENGL 627 Literary Genre**
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A study of a literary genre, such as poetry, fiction, or drama.

**ENGL 636/ENED 636 Teaching Writing**
Semester course; 3 lecture hours. 3 credits. Examines theories and practices of teaching writing, with emphasis on the connections between theory and practice.

**ENGL 637 Theories of Rhetoric and Composition**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 636. A study of theory and scholarship in rhetoric and writing.

**ENGL 643/ENED 643 Teaching Basic Writing Skills**
Semester course; 3 lecture hours. 3 credits. Emphasis on developing the student’s ability to teach fundamental skills, including such topics as diagnosis of writing problems, strategies for correcting problems, and methods for evaluating progress.

**ENGL 651 Topics in Teaching Composition**
Semester course; 1-3 lecture hours. 1-3 credits. A course for the examination of a specialized issue, topic, or problem in teaching composition.

**ENGL 652 Studies in Writing and Rhetoric:**
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A study of an area or specialized issue in rhetoric and/or writing such as the history of rhetoric, theories of invention, qualitative research methods in writing, or studies in style.

**ENGL 661 Themes in Interdisciplinary Studies**
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A study in depth of a theme, topic, or concept involving two or more disciplines.

**ENGL 666 Creative Writing: Fiction**
Semester course; 3 workshop hours. 3 credits. May be repeated for credit. Prerequisite: Graduate standing in M.F.A. program or permission of the Creative Writing Committee. All students seeking to enroll must contact the creative M.F.A. director. Study of the art of fiction writing, with the goal of producing professionally acceptable and publishable fiction. Workshop members shall produce a substantial amount of writing, short stories or a portion of a novel, and in addition shall be able to evaluate and articulate the strengths of their own work. Graded as pass/fail.

**ENGL 667 Creating Writing: Poetry**
Semester course; 3 workshop hours. 3 credits. May be repeated for credit. Prerequisite: Graduate standing in M.F.A. program or permission of the Creative Writing Committee. All students seeking to enroll must contact the creative M.F.A. director. Study of the art of poetry writing, with the goal of producing professionally acceptable and publishable poetry. Workshop members shall produce a substantial amount of poetry and in addition shall be able to evaluate and articulate the strengths of their own work. Graded as pass/fail.

**ENGL 668 Creative Writing: Drama**
Semester course; 3 workshop hours. 3 credits. May be repeated for credit. Prerequisite: Graduate standing in M.F.A. program or permission of the Creative Writing Committee. All students seeking to enroll must contact the creative writing M.F.A. director. Study of the art of playwriting with the goal of creating plays that are suitable for production. Workshop members shall produce a substantial volume of writing, one-act plays, or a portion of a longer play, and, in addition, shall be able to evaluate and articulate the strengths of their own work. Graded as pass/fail.

**ENGL 670 Literary Editing and Publishing**
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A course in which the student learns to edit fiction, poetry, drama, or nonfiction. Genre covered will vary from semester to semester. Attention
will be paid to the ways in which editors work with writers in all the technical aspects of editing, revising, and publishing. Ethical responsibilities of editors to authors and their texts will be stressed. Questions considering the publishing world at large will be considered.

**ENGL 671 Film and Television Scripts**
Semester course; 3 lecture hours. 3 credits. Study of the theory and practice of producing shooting scripts for television and motion pictures. Emphasis will be placed on the various kinds of scripts most commonly used by directors and cinematographers (e.g., silent, narrated, and dramatized). Attention will also be paid to the ways in which script writers adapt material to audiences, and the ways in which strict time frames are imposed on scripts. Students will write scripts of various kinds and lengths.

**ENGL 672 Writing Nonfiction**
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisite: Permission of instructor. Study and practice of writing one or more modes of nonfiction on the professional or preprofessional level, under critical supervision. Emphasis will be placed on such matters as organization, style, revision, and adaptation to particular audiences and publications. Possible kinds of writing could include reports; writing based on statistics; writing textbooks; writing separate chapters of books; and writing reviews, criticism, and advocacy materials.

**ENGL 673 Teaching Creative Writing**
Semester course; 3 lecture hours. 3 credits. The course is intended for those who teach or plan to teach creative writing. A comparative analysis of different approaches to the teaching of creative writing. Attention will be paid to the different ways in which elements such as dialogue, sound pattern, scene development, line break, meter, voice, and distance can be taught.

**ENGL 692 Independent Study**
1-3 hours. Variable credit. Maximum of 6 credits. Prerequisite: Permission from department chair. For students in English/English edusue, in depth, a particular problem or topic about which an interest or talent has been demonstrated.

**ENGL 694 Internship in Writing**
Semester course; 1 lecture and 6 practicum hours. 3 credits. Permission of director of M.A. program required. Analyses and practices of professional writing in settings such as business, government and industry.

**ENGL 798-799 Thesis**
Continuous courses; hours to be arranged. Credits to be arranged; 1-3 credits per course. Preparation of a thesis or project based on independent research or study and supervised by a graduate adviser.

**Foreign Languages**

**FRLG 510 Language Learning and Technology**
Semester course; 3 lecture hours. 3 credits. Introduces the variety of ways technology can be used to enhance language instruction and student learning. Targeted technologies include audio/visual media, language learning software, the Internet and multimedia resources. Attention will also be given to considerations of learning style, curricular integration and enhancement.

**FRLG 591 Topics in Foreign Languages**
Semester course; 1-4 lecture hours. 1-4 credits. A detailed study of selected topics in one or more of the foreign language or comparative courses offered by the department.

**Forensic Science**

**FRC 505 Forensic Entomology**
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Focuses on the proper techniques in the taxonomic identification of forensic insects and proper methods of postmortem interval determinations. Students will be responsible for the identification of insects, a reference collection of specimens, and the processing of a mock crime scene for entomological evidence.

**FRC 571/CRJS 571 Survey of Forensic Science**
Semester course; 3 lecture hours. 3 credits. History and current status of forensic science as the intersection of crime, law, biology, and chemistry. Review of specialties within the field, analytical techniques employed, and career opportunities in the field.

**FRC 670/CRJS 670 Forensic Evidence and Criminal Procedure**
Semester course; 3 lecture hours. 3 credits. Presents the law of criminal procedure and rules of evidence as applied to forensic science. Explores issues of scientific versus legal burdens of proof, legal terminology, and trial procedure.

**FRC 671 Drug Analysis**
Semester course; 3 lecture and/or laboratory hours. 3 credits. Chemical and pharmacological aspects of commonly abused drugs. Drug classification and analysis using chromatography and spectroscopy.

**FRC 672 Advanced Drug Analysis**
Semester course; 3 lecture and/or laboratory hours. 3 credits. Isolation and identification of abused drugs emphasizing the analysis of unknowns, problems encountered in analysis, and chain of custody issues.

**FRC 673 Trace Evidence**
Semester course; 3 lecture and/or laboratory hours. 3 credits. Presents the physical and chemical properties and analysis of arson and explosives, gun shot residue, paint and blood spatter analysis, and crime scene documentation.

**FRC 674 Criminalistics**
Semester course; 3 lecture and/or laboratory hours. 3 credits. Microscopic analysis and identification of fingerprints, questioned documents, fibers, glass fragments, and hair. Evidence collection and preservation.

**FRC 675 Serology and DNA**
Semester course; 3 lecture and/or laboratory hours. 3 credits. Identification and analysis of blood and body fluids, species determination, electrophoresis, introduction to DNA.

**FRC 676 Forensic Biology and DNA**
Semester course; 3 lecture and/or laboratory hours. 3 credits. Extraction and purification of DNA, sample evaluation, analysis, and interpretation of genetic testing.

**FRC 677 Expert Testimony in Forensic Science**
Semester course; 3 lecture hours. 3 credits. Examines forensic testimony in the courtroom, communication of scientific findings to a general audience, public speaking skills, trial preparation and cross-examination in moot court format. This course should be taken near the end of the degree program.

**FRC 680/CRJS 680 Forensic Psychiatry**
Semester course; 3 lecture hours. 3 credits. Guilty mind requirements in criminal law. Competency to stand trial, insanity defense, mental disorder and crime. Behavioral profiling of serial murderers and sex offenders. Issues in the use of clinical and statistical prediction methods in criminal justice.

**FRC 692 Forensic Science Independent Study**
Semester course; variable hours. 1-3 credits. Maximum credit for all independent study is 6 credits. The amount of credit must be determined, and written permission of instructor and program director must be obtained prior to registration for this course. A course designed to provide an opportunity for independent research in an area of forensic science. The products of this experience will be an oral presentation at a campus seminar and a written report.

**FRC 793 Forensic Science Laboratory Internship**
Semester course; variable laboratory hours. 1-3 credits. 100 hours of laboratory work per credit. 3 credits or 300 hours of laboratory work required for graduation. Students must apply to the program director for this internship a semester in advance. Students conduct replication, validation or other analyses in a specialization area of interest in a laboratory and gain practical experience in crime laboratory practices and methods. The product of this experience will be presentations at a campus seminar and/or professional conference, and a written report. This capstone course should be taken near the end of the degree program.

**French**

**FREN 500 French for Graduate Students**
Semester course; 3 lecture hours. 3 credits. This course is designed to prepare graduate students for the reading knowledge examination for higher degrees. Each graduate department will determine the nature and form of certifying examination.

**FREN 501 French Communication**
Semester course; 1-4 lecture hours. 1-4 credits. An intensive study of communication in French. Variable credits; primarily oral, written, and listening tests.

**FREN 511 French Civilization**
Semester course; 1-4 lecture hours. 1-4 credits. Prerequisite: Functional fluency in French since the class will be taught in French. A comprehensive study of the civilization and culture of France and its global expressions.
Geography

GEOG 521/URSP 521/ENVS 521 Introduction to Geographic Information Science
Semester course; 2 lecture and 2 laboratory hours. 3 credits. An introduction to creating and using geographically referenced databases for urban and environmental analysis and planning. Includes geographic and remote sensing data structures, global positioning systems, spatial analysis, geographic data standards, public domain software and data resources, and principles of cartographic design. Lab exercises in the use of geographic information systems software tools.

GEOG 550 Physical Geography of Virginia
Semester course; 6 field hours. 3 credits. Field course, traversing the varied physical regions of Virginia with emphasis on the climate, terrain, soils, and vegetation of each region and on the transitional zones in between. Human modification of the physical environment and its consequences are also stressed.

GEOG 551 Cultural Geography of Virginia
Semester course; 6 field hours. 3 credits. Field course, traversing the various cultural regions of Virginia with emphasis on basic economic activities of each area, the cumulative effect of occupation of the regions, and past and present changes in the cultural landscape.

GEOG 626/URSP 626 GIS Applications for Planners
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: URSP 623. Examines in detail Geographic Information Systems.

GEOG 680 Geography Workshop
Semester course; 1 lecture or 2 field hours per credit. 1-6 credits. Lecture, laboratory and/or field course. May be repeated with different topics to maximum of 9 credits. An intensive study of a particular area or topic in geography. See the Schedule of Classes for specific workshops to be offered each semester.

German

GRMN 500 German for Graduate Students
Semester course; 3 lecture hours. 3 credits. This course is designed to prepare graduate students for the reading knowledge examination for higher degrees. Each graduate department will determine the nature and form of the certifying examination.

GRMN 502 German Communication
Semester course; 1-4 lecture hours. 1-4 credits. An intensive study of communication in German. The content of this course will emphasize primarily oral, written, and listening skills.

GRMN 512 German Civilization
Semester course; 1-4 lecture hours. 1-4 credits. Prerequisite: Functional fluency in German since the class will be taught in German. A comprehensive study of the civilization and culture of Germany and its global expressions.

History

HIST 511 Studies in American History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Study of a selected topic in American history, primarily through lectures and readings. See the Schedule of Classes for specific topics to be offered each semester.

HIST 515 Studies in European History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Study of a selected topic in European history, primarily through lectures and readings. See the Schedule of Classes for specific topics to be offered each semester.

HIST 519 Studies in Ethnic and Social History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Study of a selected topic in ethnic or social history, primarily through lectures and readings. See the Schedule of Classes for specific topics to be offered each semester.

HIST 523 Studies in Virginia and Southern History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Study of a selected topic in Virginia or Southern history, primarily through lectures and readings. See the Schedule of Classes for specific topics to be offered each semester.

HIST 527 Studies in African-American History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Study of a selected topic in African-American history, primarily through lectures and readings. See the Schedule of Classes for specific topics to be offered each semester.

HIST 591 Special Topics in History
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for a maximum of 9 credits. An intensive study of a selected topic in history.

HIST 601 Historiography and Methodology
Semester course; 3 lecture hours. 3 credits. A study of the development of history as a discipline from ancient times to the present. The course examines the evolution of historical theory and philosophy, great historians, schools of interpretation, and problems of historical methodology. This course is a prerequisite for research seminars.

HIST 611 Readings in American History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Analysis of major studies and interpretative trends in a particular area of American history through readings and class discussions. See the Schedule of Classes for specific topics to be offered each semester.

HIST 615 Readings in European History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Analysis of major studies and interpretative trends in a particular area of European history through readings and class discussions. See the Schedule of Classes for specific topics to be offered each semester.

HIST 619 Readings in Ethnic and Social History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Analysis of major studies and interpretative trends in a particular area of ethnic or social history through readings and class discussions. See the Schedule of Classes for specific topics to be offered each semester.

HIST 623 Readings in Virginia and Southern History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Analysis of major studies and interpretative trends in a particular area of Virginia or Southern history through readings and class discussions. See the Schedule of Classes for specific topics to be offered each semester.

HIST 627 Readings in African-American History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Analysis of major studies and interpretative trends in a particular area of African-American history through readings and class discussions. See the Schedule of Classes for specific topics to be offered each semester.

HIST 631 Research in American History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Analysis of significant problems in a particular field of American history through research, writing, in-class presentations and discussions. See the Schedule of Classes for specific topics to be offered each semester.

HIST 635 Research in European History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Analysis of significant problems in a particular field of European history through research, writing, in-class presentations and discussions. See the Schedule of Classes for specific topics to be offered each semester.

HIST 639 Research in Ethnic and Social History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Analysis of significant problems in a particular field of ethnic or social history through research, writing, in-class presentations and discussions. See the Schedule of Classes for specific topics to be offered each semester.

HIST 643 Research in Virginia and Southern History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Analysis of significant problems in a particular field of Virginia or Southern history through research, writing, in-class presentations and discussions. See the Schedule of Classes for specific topics to be offered each semester.

HIST 647 Research in African-American History
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Analysis of significant problems in a particular field of African-American history through research, writing, in-class presentations and discussions. See the Schedule of Classes for specific topics to be offered each semester.

HIST 692 Independent Study
Semester course; 1-3 credits. Maximum of 6 credits. Prerequisite: Permission of department chair. Requires an analysis of a
historical problem or topic in depth under faculty supervision.

**HIST 693 Internship in History**
Semester course; variable hours. 2-4 credits per semester. Maximum of 6 credits. Determination of the amount of credit and permission of departmental internship coordinator must be procured prior to registration for this course. Students receive credit for work on historical projects with approved agencies.

**HIST 698 M.A. Thesis**
1-6 credits. May be repeated for a maximum of 6 credits.

**Humanities and Sciences**

**HUMS 591 Special Topics**
Semester course; variable hours. 1-4 credits. May be repeated with different content. Specialized topics in the liberal arts and sciences designed to provide an overview of a topic not provided by an existing course or program. May be multidisciplinary.

**International Studies**

**INTL 514/NURS 514 International Perspectives on Community Health in Developing Countries**
Semester course; 1 lecture and 2 laboratory hours. 3 credits. This course may be taken for a maximum of 6 credits in two different worlds: undergraduate (junior or senior level) and graduate students. Examines the impact of national and international policy decisions on the health and well-being of individuals and communities (country varies semester to semester). Examines the relationship of cultural beliefs and values on health-seeking behaviors. Allows students to become immersed in a culture different than their own. Evaluates the impact of international conflict and economic development on the health status of the community. See the Schedule of Classes for location.

**INTL 591 Topics in International Studies**
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for a maximum of 12 credits. Open to undergraduate (junior or senior level) and graduate students. A detailed study of selected topics in one or more geographic areas or comparative studies of global phenomena. See the Schedule of Classes for specific topics to be offered each semester.

**Mass Communications**

**MASC 501 Journalistic Writing**
Semester course; 2 lecture and 4 laboratory hours. 4 credits. Prerequisite: School’s permission. Typing skill required. See School of Mass Communications for details. A concentrated course in journalistic writing, including news, features, sports, columns, and editorials.

**MASC 502 Editing the News**
Semester course; 2 lecture and 4 laboratory hours. 4 credits. Prerequisite: School’s permission. A concentrated course in editing for journalistic publications. Course will include copy editing, headline writing, publications page make-up and design, and editorial decision making.

**MASC 519 Journalism in the Schools**
Semester course; 3 lecture hours. 3 credits. Study of school newspapers, magazines, and yearbooks: problems relating to staff selection, content, design, copy layout, advertising, and business phases.

**MASC 520 Advising Scholastic Publications**
Semester course; 3 lecture hours. 3 credits. Designed for new advisers. The goals of this class are to introduce the fundamentals of scholastic journalism and to provide a foundation in the management skills necessary to teach journalism and advise a student publication. The course covers the role of the adviser, the role and scope of the publication, financing the publication, production schedules, advertising sales and design, layout and design issues, staff morale, student evaluation, working with key outsiders and with sources. Students will develop a staff manual for a school’s publication.

**MASC 601 Advertising Technology for Art Directors**
Semester course; 3 laboratory hours. 3 credits. Restricted to Adcenter students only. This course covers technology applications applicable to art directors. Students will learn how to create and manipulate pre-existing images using Adobe Photoshop for the Macintosh. This class also includes instruction on scanning and digital photography. It will cover topics in applications that are instrumental in the development of advertising materials, including silhouetting, adding shadows, managing layers, managing file formats, color correction, complex compositioning of multiple images, and the application of filters for various effects. Additionally, this course covers scanning, digital photography, and page layout techniques applicable for art directors. Students will learn how to create and manipulate documents (ads) using QuarkXPress for the Macintosh. The course will cover all aspects of ad production, including typesetting, image placement, document management, master pages, color output, and an extensive study of typography commands.

**MASC 602 Advertising Technology for Copywriters, Strategists and Media Planners**
Semester course; 2 laboratory hours. 2 credits. Restricted to Adcenter students only. This course covers a number of computer applications, tailored to the specific needs of copywriters, account managers, account planners and media planners. Students will learn how to create and format documents using Microsoft Word for the Macintosh, including placement of images and manipulation of text from various sources such as the Internet. Students will learn how to create computer presentations with Microsoft PowerPoint. This course will teach the basics of page layout, including formatting documents, placement of images and basic typography. Additionally, students will learn how to use a scanner to capture images into Adobe Photoshop, and basic image modification techniques, such as brightening and sharpening, silhouetting an image, and using the image. Additionally, as course covers the appropriate applications designed to capture and edit digital video, and will include discussion of the use of the Adcenter’s digital video cameras, and other accessories such as external microphones and lights. Certain applications specific to the needs of media planners and account planners, such as Simons, SRDS, and MRI also will be covered in this course.

**MASC 603 Scholastic Yearbooks**
Semester course; 3 lecture hours. 3 credits. Prerequisite: School’s permission. The organization, staffing, content, illustration use, production techniques, typography, style, theme, advertising, and business functions of a scholastic yearbook. The role of the yearbook adviser will be emphasized.

**MASC 604 Broadcasting in High Schools**
Semester course; 3 lecture hours. 3 credits. Prerequisite: School’s permission. An examination of radio and television as student media in high schools. Broadcasting principles, directing and producing high school broadcast programs. Emphasis is upon the role of the adviser-teacher.

**MASC 605 Technology in the Classroom**
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Beginning with a brief treatment of basic design and publishing skills, students will learn layout and design using newspaper, magazine and yearbook models. They will master the functions of Photoshop, Illustrator, Adobe PageMaker and/or Quark Xpress and create promotional fliers/brochures and advertisements for their journalism programs. They will set templates and a style palette for school publications.

**MASC 606 Contemporary Newspaper Design**
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisites: MASC 502 and MASC 605. Students will study advanced layout and design techniques using professional newspaper models, including design fundamentals and the latest trends. They will learn to combine informational graphic techniques, typography and printed word to increase the readability of their publications and to take advantage of the range of information technologies and techniques available.

**MASC 607 Student Press Law Rights and Responsibilities**
Semester course; 3 lecture hours. 3 credits. A review of student press law with special attention to the responsibilities of student journalists and their advisers. An in-depth study of current cases that includes student press freedom and censorship, libel, privacy invasion, copyright law and ethical decision-making plus advisers’ rights. Emphasis will be on the First Amendment rights in publishing secondary-education publications. Additional topics will include ethical and legal issues surrounding Internet usage in reporting and online editing.

**MASC 611 Research Methods in Mass Communications**
Semester course; 3 lecture hours. 3 credits. Fundamentals of mass communications research techniques (content analysis, survey research, experimental design, historiography), including an overview of computer applications, statistics, theory development, and trends in the published literature.

**MASC 612 Mass Communications Theory**
Semester course; 3 seminar hours. 3 credits. Nature, function, and application of mass
communications theory; structure, content, and effects of media systems; social and technological events accounted for by a generalized theory of mass communications.

MASC 613 Mass Media and Society Semester course; 3 seminar hours. 3 credits. A study of mass media, including mass media of the United States, with special attention to their historical development and their impact on other institutions. Consideration of ethical and legal aspects of the media, and problems such as access, control, and accountability.

MASC 614 Media-governmental Relations Semester course; 3 seminar hours. 3 credits. Study of the interaction between the media and the government, and the role of the press in the governmental process as a disseminator, opinion-maker, and adversary.

MASC 615 Depth Reporting Semester course; 3 seminar hours. 3 credits. Prerequisites: three undergraduate reporting courses or permission of instructor. A thorough exposure to one or more issues in the forefront of the news, the environment, education, health care, science and others relevant to today’s readers.

MASC 616 Mass Communication Law Semester course; 3 lecture hours. 3 credits. An intensive examination of media rights and restrictions, including libel, privacy, access to information, copyright, free-press fair-trial. Attention will be given to First Amendment theory, research techniques and administrative regulation of broadcasting and advertising.

MASC 617 Advanced Research Methods Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 611. An examination of a mass medium through design and execution of a research project using one of the traditional research techniques of the field. Students will have major and minor projects for systematic study of a medium.

MASC 618 Media Economics and Management Semester course; 3 colloquium hours. 3 credits. Prerequisites: MASC 611 and MASC 617. Advanced work in media management research based on an examination of major contemporary issues and challenges concerning media management and economics. Student interaction with faculty, media managers and each other will lead to the design and implementation of major problem-solving projects.

MASC 619 Media and Public Opinion Semester course; 3 lecture hours. 3 credits. A study of the role of the mass media in the formation and change of beliefs and attitudes, the involvement of the media with policy makers in shaping public opinion and public policy, and the interaction of media and public opinion polling.

MASC 620 Seminar in Mass Communications History Semester course; 3 credits. An examination of historical methods and content as related to the investigation and writing of mass communication history in the United States. Special attention is placed on the adaptation and the use of historical method by mass communications historians.

MASC 621 Advanced Public Relations Semester course; 3 lecture hours. 3 credits. Students will explore a variety of case studies, decision-making analyses and advanced public relations programming in relation to private and public policy-making at the senior levels of management.

MASC 622 TV Documentary Semester course; 3 credits. Prerequisite: Permission of instructor is required. Knowledge of documentary history and development is preferred. Research, development and production of a television documentary. Class members will work on single television documentary segments. Topic will be decided by the instructor in conjunction with the Public Broadcasting Station in Virginia.

MASC 623 Ethics in Mass Communications Semester course; 3 lecture hours. 3 credits. Restricted to Adcenter students only. Examination and analysis of contemporary issues and problems in conventional and new media. Focus will be on the philosophical foundations of mass communication along with applications to one or more of the areas of practice in mass communications: advertising, journalism, public relations and news media. Implications of ethical practice for both audiences and creators of communications messages will be studies.

MASC 624 Basic Photojournalism Semester course; 2 lecture and 3 laboratory hours. 3 credits. An introduction to photojournalistic techniques and practices including how to teach a student publication staff to recognize good pictures and how to use them well in their publications. An overview of photojournalism, including black and white and color photography, technique, organizing and presenting assignments, and the history of photojournalism. Emphasis on the impact of photojournalism on society.

MASC 629 Strategic Thinking Semester course; 3 lecture hours. 3 credits. Restricted to Adcenter students only. Contrasting historically rigid ways of approaching problems to newer, more dynamic approaches will prepare students to professionally engage a constantly shifting world of business, consumer, political and economic forces. Students will engage in semester-long projects to develop new ways of thinking strategically, including writing a strategic plan and scenario plans (the art of looking ahead and envisioning various realities for a company). Students will work directly with local small business owners in developing and formally presenting relevant strategies.

MASC 630 Advertising Layout and Typography Semester course; 2 lecture and 2 laboratory hours. 3 credits. Utilizes in-class workshops and projects to develop students’ ability to incorporate effective design technique into the visual elements of advertising. Focuses on various typographic design trends and layout techniques to effectively communicate information in various print media. Introduces new computer technology that helps students address cutting-edge issues in modern advertising.

MASC 631 Advanced Art Direction/Advertising Layout Techniques Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 630 and MASC 651. This course explores management issues affecting advertising art directors in complex projects that encompass more than one media. Focus is on skills needed to manage studio artists, photographers, illustrators, engravers and printers in the production of advanced advertising layouts.

MASC 640 Copywriting Techniques Semester course; 3 lecture and 2 laboratory hours. 4 credits. Focuses on developing ability to create well-written, creatively focused advertising copy work. Addresses headline and body copy issues through presentation of students’ work and research on major copywriters and their work.

MASC 641 Advanced Copywriting Techniques Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: MASC 640 and MASC 651. Applies student’s knowledge of copywriting to larger, more complex and major advertisements. Students will learn the role planning plays in advertising production, especially in the development of creative work. Relationship management skills also will be nurtured as students work with art directors and copywriters. Consumer segments will be explored through several other avenues of inquiry.

MASC 649 Strategic Insight Development Semester course; 3 lecture hours. 3 credits. Restricted to Adcenter students only. This course is organized like the planning department of an advertising agency. Students will be introduced to the development of strategic insights for clients through the creation and presentation of briefs. Students will learn the role planning plays in advertising production, especially in the development of creative work. Relationship management skills also will be nurtured as students work with art directors and copywriters. Consumer segments will be explored through several other avenues of inquiry.

MASC 650 Perspectives in Advertising Semester course; 2 lecture and 2 laboratory hours. 3 credits. Focuses on developing the creative skills necessary for solving advertising communication problems. Enables students to maximize and strengthen creative abilities through lecture, brainstorming sessions, and team-oriented strategy sessions focusing on real case projects.

MASC 652 Advertising Concept Development Semester course; 2 lecture and 2 laboratory hours. 3 credits. Focuses on developing the creative skills necessary for solving advertising communication problems. Enables students to maximize and strengthen creative abilities through lecture, brainstorming sessions, and team-oriented strategy sessions focusing on real case projects.

MASC 653 Advertising Advanced Concept Development Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: MASC 652
MASC 654 Advertising Radio and Television Production
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Emphasizes a team approach to copywriting and art direction.

MASC 655 Nontraditional Advertising Campaigns
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 652 for copywriting and MASC 649 for art direction majors. Adcenter students only. Involves application of all the skills and concepts learned in the disciplines of art direction, copywriting, account planning and media. Prerequisite: MASC 651. Develops student's ability to position the product. Students will sharpen previously prepared items as well as effective ways to manage accounts. Students will learn early in the program how to market for a product and specific issues most pertinent to that market, in regards to positioning the product. Research work with consumer groups will demonstrate student's ability to deliver thoughtful questions that will deliver valuable insight.

MASC 661 Advanced Creative Media Planning
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 650 and MASC 651. Continues the development and demonstration of conceptual and creative abilities, and insights in a variety of areas sought by agency art directors, copywriters and recruiters. Development of concepts and materials necessary for the creation of mini-books and individual portfolios will be one of the main focal points. Independent projects pursued specifically for portfolio development also will be conducted.

MASC 692 Independent Study
Semester course; 1-3 credits. A maximum of 3 credits may be offered toward the master's degree. Prerequisite: Permission of instructor and director of graduate studies.

MASC 693 Practicum in Mass Communications
Semester course; 1-6 credits. May be repeated for credit. Credits may not be applied toward the graduate degree. Prerequisite: Permission of coordinator of graduate studies. Student participation in planned educational experience under the supervision of mass communications faculty. The practicum may include supervision of writing, editing and media laboratory participation in faculty research, and assistance with lower-division undergraduate advising. Graded as pass/fail.

MASC 695 Fieldwork/Internship
Semester course; variable hours. 1, 2 or 3 credits per semester. Involves application of all the skills and concepts learned in the disciplines of art direction, copywriting, account planning and media. Prerequisite: MASC 607, MASC 610, MASC 632, MASC 629, MASC 649 and MASC 656. Continues the development and demonstration of conceptual and creative abilities, and insights in a variety of areas sought by agency art directors, copywriters and recruiters. Development of concepts and materials necessary for the creation of mini-books and individual portfolios will be one of the main focal points. Independent projects pursued specifically for portfolio development also will be conducted.

MASC 696 Ad Portfolio Development for Copywriters and Art Directors
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 640, MASC 641, MASC 652 and MASC 653. Continues the development and demonstration of conceptual and creative abilities, and insights in a variety of areas sought by agency art directors, copywriters and recruiters. Development of concepts and materials necessary for the creation of mini-books and individual portfolios will be one of the main focal points. Independent projects pursued specifically for portfolio development also will be conducted.

MASC 697 Portfolio Development for Strategists
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 640, MASC 641, MASC 652 and MASC 653. Continues the development and demonstration of conceptual and creative abilities, and insights in a variety of areas sought by agency art directors, copywriters and recruiters. Development of concepts and materials necessary for the creation of mini-books and individual portfolios will be one of the main focal points. Independent projects pursued specifically for portfolio development also will be conducted.
Mathematics and Applied Mathematics

MATH 501 Introduction to Abstract Algebra
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300 and MATH 310, or their equivalents. An introduction to groups, rings and fields from an axiomatic point of view. Coset decomposition and basic morphisms.

MATH 505 Modern Geometry
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300, and MATH 307 or MATH 310. Topics in Euclidean, projective and non-Euclidean geometries from a modern viewpoint.

MATH 507-508 Analysis I-II
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: MATH 300, MATH 307 and MATH 310, or permission of instructor. Theoretical aspects of calculus, sequences, limits, continuity, series, series of functions, integration, differential geometry.

MATH 509-510 General Topology I-II
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: MATH 300 and MATH 307. Foundations and fundamental concepts of point-set topology. Topological spaces, convergence of sequences, compactness, product spaces, quotient spaces, separation properties, metrization theorems, mappings and compactifications.

MATH 511 Applied Linear Algebra
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 310. The algebra of matrices, the theory of finite dimensional vector spaces and the basic results concerning eigenvectors and eigenvalues, with particular attention to applications.

MATH 512 Complex Analysis for Applications
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 307, and MATH 300 or knowledge equivalent to MATH 300. The algebra of matrices, complex numbers, analytic functions, integration, series, contour integration, analytic continuation, conformal mapping, with particular attention to applications.

MATH 515 Numerical Analysis I
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 310, or MATH 201 and MATH 185. Knowledge of a programming language recommended. Solutions of equations, interpolation and approximation, numerical integration, iterative methods for solving linear equations, calculation of eigenvalues and eigenvectors. Selected algorithms may be programmed for solution on computers.

MATH 516 Numerical Analysis II
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 515. Numerical solution of initial value problems in ordinary differential equations, two-point boundary value problems. Introduction to numerical techniques for solving partial differential equations. Selected algorithms may be programmed for solution on computers.

MATH 517-518 Methods of Applied Mathematics
Continuous course; 3 lecture hours. 3-3 credits. Prerequisites: MATH 301, MATH 307 and MATH 300 or knowledge equivalent to MATH 300. Vector analysis, matrices, complex analysis, special functions, Legendre and Hermit polynomials, Fourier series, Laplace transforms, integral equations, partial differential equations, boundary-value and initial-value problems.

MATH 520/OPER 520 Game Theory and Linear Programming
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 310. The mathematical basis of game theory and linear programming. Matrix games, linear inequalities and convexity, the mini-max theorems in linear programming, computational methods and applications.

MATH 521 Introduction to Algebraic Number Theory
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 301. Introduction to algebraic number fields with emphasis on quadratic and cyclotomic fields. Units, primes, unique factorization.

MATH 525 Introduction to Combinatorial Mathematics
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300 and MATH 310, or permission of instructor. Introduction to the problems and methods of solution in the enumeration, existence and construction of some discrete mathematical structures. Discussion of generating functions, recurrence relations, Ramsey’s theorem, matching theory, combinatorial designs, Latin squares and linear coding theory.

MATH 530 The History of Mathematics
Semester course; 3 lecture hours. 3 credits. Prerequisite: 17 credits at the 200 level or above in mathematical sciences or permission of instructor. Surveys major trends in the development of mathematics from ancient times through the 19th century and considers the cultural and social contexts of mathematical activity. Either MATH 530 or MATH 531 (but not both) may be applied to the M.Ed. in Curriculum and Instruction with a concentration in secondary education/mathematics.

MATH 531 Expositions in Modern Mathematics
Semester course; 3 lecture hours. 3 credits. Prerequisite: Six credits at the 400 level or above in mathematical sciences or permission of instructor. Surveys major trends in the development of mathematics from ancient times through the 19th century and considers the cultural and social contexts of mathematical activity. Either MATH 530 or MATH 531 (but not both) may be applied to the M.Ed. in Curriculum and Instruction with a concentration in secondary education/mathematics.

MATH 532 Ordinary Differential Equations I
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 301 and 310 or the equivalent. MATH 507 is recommended. Existence and uniqueness for systems, linear systems, fundamental matrix solutions, matrix exponential, nonlinear systems, plane autonomous systems and introduction to stability.

MATH 555/ENGR 555 Dynamics and Multivariable Control I
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301 and 310 or the equivalent. Systems of differential equations with controls, linear control systems, controllability, observability, introduction to feedback control and stabilization.

MATH 591 Topics in Mathematics
Semester course; 1-3 credits. May be repeated for credit with different topics. Prerequisite: Permission of the instructor. Open to qualified undergraduates. A study of selected topics in mathematical sciences. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

MATH 601-602 Abstract Algebra I, II
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: MATH 501. A study of algebraic structures (including groups, rings, and fields), Galois theory, commutative algebra, subalgebras, direct products, direct decompositions, subdirect decompositions, free algebras, varieties of algebras.

MATH 603-604 Advanced Probability Theory
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: MATH 508, and STAT 503 or STAT 513. A measure-theoretic approach to the theory of probability. Borel sets, probability measures, and random variables. Special topics include characteristic functions, modes of convergence, and elements of stochastic processes.

MATH 607-608 Real Analysis I, II
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: MATH 508. The real number system, Lebesgue measure functions of bounded variation, differentiation and integration, the LP spaces, introduction to Banach and Hilbert spaces, general measure theory, and the Lebesgue-Stieltjes integral.

MATH 611-612 Complex Analysis I, II
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: MATH 508. Elementary functions, analyticity, Cauchy’s theorem and integral formula, Taylor and Laurent series, poles, residues, approximation of analytic functions, Riemann surfaces, periodic functions, conformal mapping, and applications.

MATH 615 Topics in Numerical Analysis
Semester course; 3 lecture hours. 3 credits. May be taken twice for credit. Prerequisites: MATH 515, MATH 516 and permission of instructor. Special topics in computer methods for numerical analysis selected from such subjects as analysis of numerical methods for solving ordinary differential equations; elliptic, hyperbolic, and parabolic partial differential equations; solutions of large linear systems by iterative methods.

MATH 617-618 Applied Mathematics I, II
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: MATH 517-518. Partial differential equations; separation of variables, Fourier series, Laplace, and Poisson; the diffusion equation, integral transforms, Green’s function methods, calculus of variation, eigenvalues and eigenfunctions by numerical methods, integral equations, and Fredholm and Hilbert-Schmidt theories.

MATH 619 Operational Methods
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 508. Transform methods
applied to existence theory, explicit solutions to problems of mathematical physics, distributions of Schwartz and Gelfand-Silov, kernel theorems of Schwartz, mathematical framework of quantum field theory.

**MATH 620 Theory of Partial Differential Equations**
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301 and MATH 508. Classification of partial differential equations; elliptic, hyperbolic, and parabolic equations; potential theory, techniques of solving various partial differential equations; application to electromagnetism and solid mechanics.

**MATH 621 Boundary-Value Problems**
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 517. Survey of boundary-value problems, approximate analytic solutions such as Galerkin’s method and the Ritz method; application to heat transfer, fluid mechanics, and potential theory.

**MATH 632 Ordinary Differential Equations II**
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 507 and 532, or permission of instructor. Existence and uniqueness theorems, invariant manifolds associated with equilibria and Lyapunov stability analysis.

**MATH 655/ENGR 655 Dynamics and Multivariable Control II**
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 555 and MATH 507 recommended, or permission of instructor. Control problems for nonlinear systems of ordinary differential equations, methods of feedback control to achieve control objectives.

**MATH 690 Research Seminar**
Semester course; 1 credit. May be repeated for credit. Prerequisite: Graduate standing. Discussion of topics in the mathematical sciences as stimulated by independent reading in selected areas and at least one oral presentation by each student.

**MATH 691 Special Topics in Mathematics**
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for credit. Prerequisite: Permission of instructor. A detailed study of selected topics in mathematics. Topics include commutative rings and algebras, topological groups, special functions, Fourier analysis, abstract harmonic analysis, operator theory, functional analysis, differential geometry, Banach algebras and control theory.

**MATH 697 Directed Research**
Semester course; variable hours. 1-3 credits per semester. May be repeated for credit. Prerequisite: Graduate standing. Supervised individual research and study in an area not covered in the present curriculum or in one which significantly extends present coverage. Research culminates with an oral presentation and submission of a written version of this presentation to the supervising faculty member.

**MATH 698 Thesis**
Hours to be arranged. 1-3 credits. A total of 3 or 6 credits may be applied to the M.S. in Mathematical Sciences/Applied Mathematics or to the M.S. in Mathematical Sciences/Mathematics. May be repeated for credit. Prerequisite: Graduate standing. Independent research culminating in the writing of the required thesis as described in this bulletin. Grade of “S,” “U” or “F” may be assigned in this course.

### Operations Research

**OPER 520/MATH 520 Game Theory and Linear Programming**
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 310. The mathematical basis of game theory and linear programming. Matrix games, linear inequalities, and convexity, the min-max theorems in linear programming, computational methods and applications.

**OPER 527 Deterministic Operations Research**
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 245 or 255, MATH/STAT 309, and MATH 310 or permission of the instructor. Introduction to decision making using mathematical programming and system optimization. Topics include linear programming and the simplex method, nonlinear optimization and evolutionary methods. Applications to manufacturing, transportation, inventory control, project management and scheduling problems.

**OPER 528 Stochastic Operations Research**
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 245 or 255, MATH/STAT 309, and MATH 310 or equivalent. Introduction to decision making under uncertainty and the modeling of stochastic system. Topics include decision analysis, decision trees, attitudes to risk and the concept of utility, Monte Carlo simulation and risk analysis, discrete Markov Chains, birth-death processes, and service systems. Applications to decision problems in business and engineering will be discussed.

**OPER 591 Topics in Operations Research**
Semester course; 1-3 lecture hours. 1-3 credits. May be taken more than once for credit. Prerequisite: Permission of the instructor. A detailed study of selected topics in operations research.

**OPER 631 Mathematical Programming**
Semester course; 3 lecture hours. 3 credits. Prerequisite: OPER 527. Necessary and sufficient conditions for optimal solutions. Duality theory. Theoretical and practical development of solution techniques for operations research problems. Some current algorithms will be discussed.

**OPER 635 Network Models and Graph Theory**
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 401 or permission of instructor. This course will focus on optimization models for network problems, as well as on the underlying graph theoretic structure for such models. Emphasis will be on solution procedures and applications with some discussion of related implementation issues. The course will concentrate on the study of polynomial-time algorithms for well-solved problems. May also include treatment of solution techniques for NP-hard network problems. Possible topics include, but are not limited to, maximum flows/minimum cuts in networks, minimum spanning trees, minimum cost flows, matching and assignment, shortest path problems, traveling salesman problems and multimmodity flows.

**OPER 639 Practical Optimization**
Semester course; 3 lecture hours. 3 credits. Prerequisites: OPER 527 and CMSC 255. The application of optimization theory toward the solution of practical problems in operations research. The use and analysis of computer programs available to solve such problems. The algorithms used in this course will be discussed from a practical and theoretical point of view.

**OPER 641 Discrete Event System Simulation**
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 541 or equivalent. An introduction to the application and theoretical background of system simulation. Topics include systems concepts, modeling systems using discrete events and the modeling of manufacturing and materials handling systems, computer systems and service systems through simulation. Theoretical topics include random variable generation, model verification and validation, statistical analysis of output, variance reduction techniques and optimization via simulation. A programming simulation language will be utilized. Students will complete and present a simulation project.

**OPER 643 Decision and Risk Analysis**
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH/STAT 309. This course presents the decision and risk analysis theory and methodology. Decision analysis applies to hard problems involving sequential decisions, major uncertainties, significant outcomes, and complex values. The course includes: decision structuring with influence diagrams and decision trees; modeling uncertainty with subjective probabilities; sensitivity analysis and the value of information; and modeling preferences with utility functions. Decision and risk analysis applications in business and government are considered.

**OPER 645 Queuing Theory**
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 245 or 255, MATH/STAT 309, and MATH 310 or permission of instructor. An introduction to queuing theory and methodology. The queuing systems and service systems through simulation. Theoretical topics include random variable generation, model verification and validation, statistical analysis of output, variance reduction techniques and optimization via simulation. A programming simulation language will be utilized. Students will complete and present a simulation project.

**OPER 647 Multiobjective Decision Analysis**
Semester course; 3 lecture hours. 3 credits. Prerequisite: OPER 643 or permission of instructor. Introduction to the mathematical foundations of multiattribute utility theory. Topics covered include: structuring objectives; tradeoffs under certainty; unidimensional utility theory; multiattribute preferences under uncertainty; preferences over time; and aggregation of individual preferences. Real world applications will be discussed throughout.

**OPER 648/STAT 648 Systems Reliability Analysis**
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 541 or equivalent, or permission of instructor. An introduction to engineering reliability and risk analysis, specifically failure data analysis, maintenance problems, system reliability and probabilistic risk assessment. Applications in computer science and engineering will include stochastic characterization of wear in hardware systems and the development of failure models for software systems. Decision problems such as the optimal maintenance of repairable systems and optimal testing policies for hardware and software systems will be
Philosophy
PHIL 521, 522 Aesthetics
Semester courses; 3 lecture hours. 3 credits. A critical survey of aesthetics from antiquity to the present. First semester: antiquity to the Renaissance; Second semester: the Renaissance to the present. Topics to be considered include the nature of art, aesthetic experience, the aesthetic analysis in the arts of painting, music, architecture, and the motion picture.

PHIL 591 Topics in Philosophy
Semester course; variable hours. 1-4 credits. Prerequisite: Written permission of instructor or graduate standing. A graduate level, indepth study of an individual philosopher, a particular philosophical problem, or a narrowly defined period or school. See the Schedule of Classes for specific topics to be offered each semester.

PHIL 592 Independent Study
Semester course; 1-4 credits. An independent study course to allow graduate students to do research, under the direction of a professor qualified in that field, in an area of major interest.

PHIL 601 Principles of Ethics
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing. An examination of major ethical theories and their application to contemporary issues in medicine, science, and public policy.

PHIL 602 Biomedical Ethics
Semester course; 3 lecture hours. 3 credits. An examination of ethical theory and its application to moral problems in medicine and biotechnology.

PHIL 635 Philosophy of the Social Sciences
Semester course; 3 lecture hours. 3 credits. A philosophical study of the nature of science and scientific explanation, with emphasis upon the social sciences. Topics include the philosophical analysis of objectivity in the social sciences, theories of human action, and the relation of social sciences to the physical sciences.

PHIL 683/PADM 683 Administrative Ethics
Semester course; 2 or 3 hours. 2 or 3 credits. A philosophical investigation into the problems of making ethical decisions, focusing on issues likely to confront the public administrator. Examples of such issues are equity in social services delivery, affirmative action, loyalty to the bureaucracy vs. "whistle blowing," and conflicts of interest between personal and public interests.

PHIL 691 Topics in Philosophy
Semester course; variable hours. 1-4 credits. Prerequisite: Written permission of instructor or graduate standing. A graduate level, indepth study of an individual philosopher, a particular philosophical problem, or a narrowly defined period or school. See the Schedule of Classes for specific topics to be offered each semester.

PHIL 692 Independent Study
Semester course; variable hours. 1-4 credits. Open to graduate students only. An independent study course to allow graduate students to do research, under the direction of a professor qualified in that field, in an area of major interest.

PHIL 713/PPAD 713 Ethics and Public Policy
Semester course; 3 lecture hours. 3 credits. Doctoral students only. An examination of the main theories of morality and justice. These theories' implications for public policy will be discussed.

PHYS 508 The Physical Science of Space for Teachers
Semester course; 3 credits. Prerequisites: B.S. or B.A. degree with at least two mathematics and two science courses or permission of instructor. The course is designed for the secondary physical science and physics teachers. The physical science phenomena of the earth, solar system, and the universe: mechanics, electromagnetism, optics and energy are presented for the teacher. The course curriculum closely follows the Virginia Science Standards of Learning for Physics and Physical Science. The course makes use of the Virginia Science Museum's interactive physical science exhibit galleries (aerospace, force and motion, waves and patterns, light and vision matter, crystals and electromagnetism as well as the Digistar planetarium and telescopes.

PHYS 509 Experiencing Science for Teachers
Semester course; 3 lecture hours. 3 credits. Prerequisites: B.S. or B.A. degree with at least two mathematics and two science courses or permission of instructor. Designed to give physical science and physics teachers an understanding of the methods and processes actually used by scientists in different disciplines. Students repeat classic experiments, read from original works, keep detailed research journals, participate in laboratory experiments, engage in the peer review process and present results of projects in colloquium format. The course meets at the Science Museum of Virginia and uses the interactive science exhibits; visits to science sites in the area.

PHYS 510 Physical Science Demonstrations
Semester course; 3 credits. Prerequisite: PHYS 509 or permission of instructor. The course is designed to give the working secondary physical science and physics teacher a depth of experimental interactions and effectively using experiments to interpret phenomena for students. Participants learn the essentials of developing effective apparatus for investigations, interactive exhibits and demonstrations in the physical sciences. Students will undertake and present a major project as part of the course.

PHYS 520 Introduction to Radiation Therapy Physics Laboratory
Semester course; 2 laboratory hours. 1 credit. Provides practical exercises in the radiation measurement devices and quality assurance procedures commonly employed in radiation therapy physics. Measurement of beam characteristics for treatment machines, including electron linear accelerators, and radioactive sources, including high dose rate brachytherapy are investigated.

PHYS 550 Techniques in Material Research
Semester course; 3 lecture hours. 3 credits. Prerequisite: B.S. or B.A. degree with at least two mathematics and two science courses or permission of instructor. A detailed study of selected topics in operations research. May be taken more than once for credit.

PHYS 551 Advanced Statistical Quality Control
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 541 or equivalent, or permission of instructor. Demonstrates how statistics and data analysis can be applied to process control and management. Topics include the definition of quality, its measurement through statistical techniques, variable and attribute control charts, CUSUM charts, multivariate control charts, process capability analysis, design of experiments, and classical and Bayesian acceptance sampling. Statistical software will be used to apply the techniques to real-life case studies from manufacturing and service industries.

OPER 691 Special Topics in Operations Research
Semester course; variable hours. 1-3 credits. May be taken more than once for credit. Prerequisite: Permission of the instructor. A detailed study of selected topics in operations research.

OPER 697 Directed Research
Semester course; variable hours. 1-3 credits. May be taken more than once for credit. Prerequisite: Graduate standing. Supervised individual research and study in an area not covered in the present curriculum or in one which significantly extends present coverage. Research culminates with an oral presentation and submission of a written version of this presentation to the supervising faculty member.

OPER 698 Thesis
Hours to be arranged. 1-3 credits. A total of 3 or 6 credits may be applied to the M.S. in Mathematical Sciences/Operations Research. A total of 3 credits for an expository thesis or a total of 6 credits for a research thesis.) May be taken more than once for credit. Prerequisite: Graduate standing. Independent research culminating in the writing of the required thesis as described in this bulletin. Grade of “S,” “U” or “F” may be assigned in this course.

PHYS 380 or permission of instructor. Covers the fundamental conceptual, mathematical and physical aspects of ionizing radiation. The technical aspects of the use of ionizing radiation will be emphasized.

PHYS 563 Radiological Physics and Dosimetry
Semester course; 3 lecture hours. 3 credits. Prerequisites: Equivalent of PHYS 320L or PHYS 450. This course focuses on the application of modern characterization techniques in materials research. Techniques to be studied include high-resolution X-ray diffraction, low-energy electron diffraction, light-energy electron diffraction, scanning-tunneling microscopy, molecular beam epitaxy, Auger electron spectroscopy and X-ray photoemission spectroscopy.

PHYS 567 Introduction to Radiation Therapy Physics
Semester course; 3 lecture hours. 3 credits. Prerequisites: Equivalent of PHYS 376 and PHYS 380 or permission of instructor. Covers the fundamental conceptual, mathematical and physical aspects of radiation detection and dosimetry will be emphasized.

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radiation to evoke a therapeutic response/benefit to patients. Treatment planning and dose calculations for external beam radiation therapy and brachytherapy are emphasized.

**PHYS 571 Theoretical Mechanics**
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 376 and MATH 301, or permission of instructor. An introduction to advanced dynamics involving the Lagrangian and Hamiltonian formalisms.

**PHYS 573 Analytical Methods in Physics**
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 376 and PHYS 380, or permission of instructor. Theoretical and numerical techniques in solving differential equations in condensed matter. Classification of electronic states in solids and clusters using groups, infinite series approximations, calculus of residues and causality.

**PHYS 576 Electromagnetic Theory**
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 376 and MATH 307, or permission of instructor. Maxwell’s equations of electromagnetism, vector and scalar potentials, electromagnetic waves and radiation theory.

**PHYS 580 Quantum Mechanics**
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHYS 576 and MATH 307, or permission of instructor. Theoretical quantum descriptions with emphasis upon mathematical techniques. Schrödinger equation, hydrogen atom, eigenfunctions and eigenvalues, angular momentum and spin and perturbation theory.

**PHYS 591 Topics in Physics**
Semester course; 3 lecture hours. 1-3 credits. Open to graduate students and to undergraduate students with advanced standing. An in-depth study of a selected topic in advanced physics. See the Schedule of Classes for specific topics to be offered each semester and prerequisites. Applicable toward physics major requirements.

**PHYS 601 Health Physics**
Semester course; 3 lecture hours. 3 credits. Theoretical foundation and practical application of health physics as applied to diagnostic radiology, nuclear medicine and radiation therapy. Regulatory and scientific aspects of the subject are covered. Mathematical models and physical principles of radioactive decay and radiation interactions are used to assess the relative values of different radiation safety practices.

**PHYS 630 Radiobiology for the Medical Physicist**
Semester course; 3 lecture hours. 3 credits. Covers the fundamental aspects of radiobiology with specific emphasis on relative biological effectiveness and linear energy transfer, the oxygen effect, radiation carcinogenesis, DNA repair, hereditary effects of radiation, radiation-induced cell killing, cellular responses to radiation including cell cycle effects and activation of cell signal transduction pathways, early and late effects of radiation, and time, dose and fractionation in radiotherapy.

**PHYS 633 Advanced Radiation Therapy Physics**
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisites: PHYS 563 and PHYS 573 or instructor permission. The course presents a survey of modern developments and methodological tools used in the following areas of radiation oncology physics: experimental dosimetry, computational dosimetry, quality assurance and commissioning, and advanced treatment planning and delivery modalities. By means of hands-on projects and literature reviews, students will become acquainted with the medical physics literature and acquire practical skills in selected areas. The course consists of a coordinated set of didactic lectures and laboratory projects.

**PHYS 635 Physics of X-ray Imaging and MRI**
Semester course; 3 lecture and 2 laboratory hours. 4 credits. This course will cover the physics of X-ray and magnetic resonance imaging. Emphasis will be placed on the physical foundations of currently used diagnostic techniques and their relevance to the clinical application. The classroom lectures will be enhanced through a series of integrated laboratory exercises.

**PHYS 636 Physics of CT, Nuclear Medicine, and MR Imaging**
Semester course; 3 lecture and 2 laboratory hours. 4 credits. This course will cover the physics of computed tomography, nuclear medicine imaging (including PET) and ultrasound. Emphasis will be placed on the physical foundations of currently used diagnostic techniques and their relevance to the clinical setting. The classroom lectures will be enhanced through a series of integrated laboratory exercises.

**PHYS 641 Solid State Physics**
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 510, PHYS 302 and MATH 317, or permission of instructor. Study of structure and electronic properties of materials in the solid phase.

**PHYS 650 Subatomic Physics I**
Semester course; 3 credits. Prerequisites: PHYS 576, PHYS 580 and CHEM 510. Studies of nuclei and elementary particles, reaction dynamics, particle accelerators, detection devices, particle classification, symmetries and conservation laws, quantum electrodynamics, the weak interaction, quantum chromodynamics, unified theories, the nuclear shell model and collective model, and nuclear reactions. Offered in cooperation with Virginia State University.

**PHYS 651 Subatomic Physics II**
Semester course; 3 credits. Prerequisite: PHYS 650. A continuation of PHYS 650. Offered in cooperation with Virginia State University.

**PHYS 661 Surface and Materials Physics**
Semester course; 3 credits. Prerequisites: PHYS 641, CHEM 510 or permission of instructor. This course will focus on the physics of surface, interfacial and other nanostructured material systems, and the experimental techniques used to assay their geometric and electronic properties. Topics include ultra-high vacuum techniques and design, surface geometric and electronic structure, adsorbates on surfaces and interface formation, thin film growth, and layered systems. Characterization techniques to be discussed include geometric probes (STM, AFM, RHEED, LEED, AFM, XRD) and synchrotron radiation based electronic structure probes (PES, SXF, NEXAFS).

**PHYS 663 Studies in Nuclear Physics**
Semester course; 3 credits. Credits for only two televised courses will count toward degree requirements. Courses televised by the Virginia Cooperative Graduate Engineering Program. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

**PHYS 670 Conceptual Physics for Teachers I**
Semester course; 4 studio hours. 3 credits. Prerequisites: PHYS 508, PHYS 509 and PHYS 510, or permission of instructor. First of the sequence 670-672. Development of the methodology for the experimental design at middle and high school level, concentrating on the science of measurement, materials structure and characterization, and light and optical properties of matter. The 670-672 sequence uses and develops computer-based experiments and interactive multimedia materials for use in the classroom. The course contains examples of vertical integration of technological applications of physical principles across disciplines.

**PHYS 671 Conceptual Physics for Teachers III**
Semester course; 4 studio hours. 3 credits. Prerequisite: PHYS 670 or permission of instructor. Second of the sequence PHYS 670-672. Development of the methodology for the experimental design at middle and high school level, concentrating on sound and acoustics, electromagnetism and classical mechanics.

**PHYS 672 Conceptual Physics for Teachers III**
Semester course; 4 studio hours. 3 credits. Prerequisite: PHYS 670 or permission of instructor. Third of the sequence PHYS 670-672. Development of the methodology for the experimental design at middle and high school level, concentrating on heat, thermodynamics and modern physics.

**PHYS 670 Research Seminar**
Semester course; 1 credit. May be repeated for a maximum of 4 credits. Examines current problems and developments in physics.

**PHYS 691 Special Topics**
Semester course; 3 credits. Prerequisites: At least one graduate-level physics course and permission of instructor. Second of the sequence PHYS 670-672. Development of the methodology for the experimental design at middle and high school level, concentrating on sound and acoustics, electromagnetism and classical mechanics.

**PHYS 697 Directed Research**
Semester course; 1-6 credits. May be repeated for credit. Prerequisites: At least one graduate-level physics course and permission of instructor. Research leading to the master of science degree.

**Political Science**

**POLI 553 The Military in Politics**
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. The course will examine the pervasive character and growing importance of the military in the governmental and policy-making processes. It will include a study of the history of military relations, and the changing dynamics of the relationship that occurs in response to changes in social and political contexts and as a result of technological changes in the military and warfare.
Psychology

PSYC 601 Foundations of Applied Developmental Psychology
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: graduate standing in the psychology program or permission of instructor. An introduction to developmental research and theory on applied research topics. Topics include ethical issues in applied developmental science, culture, ethnicity and child development, poverty, child abuse, nontraditional families, childcare, family instability, early childhood intervention, and parenting.

PSYC 602/GRTY 602 Psychology of Aging
Semester course; 3 seminar hours. 3 credits. Prerequisite: Permission of instructor. Psychological adjustment in late life; special emphasis on theories of cognitive, and emotional development; life crises associated with the aging process. Students must complete social sciences research methods before taking this course.

PSYC 603 Developmental Processes
Semester course; 3 lecture hours. 3 credits. Cognitive, social, personality, and behavioral development across the life span is considered, with special attention to theories of development.

PSYC 604 Social Psychology of Business and Industry
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 630 or permission of instructor. The theme is the influence of organizational processes on behavior. Topics will include motivation, attitudes, job satisfaction, morale, leadership, and supervision.

PSYC 605 Social Development
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: PSYC 603 or permission of instructor. The development of social relations, focusing primarily on infancy and childhood, but also considering adulthood and aging. Attachment, parent-child interaction, peers, siblings, aggression, sex-roles, cultural determinants, deprivation and remediation, social cognition, adulthood changes, and parenthood. Critical evaluation of theory and current research.

PSYC 606 Early and Middle Childhood Development
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: graduate standing in the psychology program or permission of instructor. An introduction to theory and research on children from toddlerhood to middle childhood. Topics include language, intelligence, early education, schooling, social cognition, theory of mind, attachment, social competence, emotions and socialization.

PSYC 607/EDUS 607 Advanced Educational Psychology
Semester course; 3 lecture hours. 3 credits. Application of the principles of psychology to the teaching-learning process. Discussion will focus on the comprehensive development of individual learning experiences and educational programs from the point of view of the educator and the administrator.

PSYC 608 Research in Counseling Psychology
Semester course; 3 lecture/semester hours. 3 credits. Prerequisite: Graduate standing in the counseling psychology program or permission of counseling committee. An introduction to the theoretical, procedural, methodological and ethical issues encountered during the conduct of empirical research in counseling psychology. Topics include the empirical analysis of such mainstream counseling research activities as assessment, interventions, consultation, supervision, training, psychosocial factors in health and prevention, career development, the study of diversity and underrepresented populations, and professional issues in counseling psychology.

PSYC 609 Contemporary Issues in Clinical Psychology
Semester course; 3 lecture/semester hours. 3 credits. Prerequisite: first-year graduate standing in clinical psychology or permission of the instructor. Informs first-year doctoral students of the philosophy behind the training and developmental elements of the doctoral program in clinical psychology in the context of the current status of contemporary issues in the field. Includes coverage of traditional and innovative training models, research issues, the role of assessment and psychotherapy in clinical psychology, the medical vs. the behavioral model of psychopathology, relations with other mental health professions, professional issues such as licensure and credentialing, and malpractice.

PSYC 610 Attitude Theory and Research
Semester course; 3 lecture hours. 3 credits. Theory and research in attitudes. Attitude formation and change, including cognitive consistency, learning and reinforcement, social judgment, and functional theories.

PSYC 611 Contemporary Developments in Counseling Psychology
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Contemporary developments, issues in the field; history, present status, and future directions in the field of counseling psychology.

PSYC 612 Seminar in Motivation
Semester course; 3 lecture hours. A survey of some theoretical views of motivation. Biological, social, cultural personality, and learning theories of motivation will be covered. Theoretical positions will be related to current empirical findings.

PSYC 613 Cognitive Development
Semester course; 3 lecture/discussion hours. 3 credits. Prerequisite standing in psychology or permission of instructor. The development of the intellectual processes, including reasoning, memory, imagery, and knowledge. Special attention will be given to theories of cognitive growth. Although the focus will be on child cognitive developments, consideration of life-span issues will be included.

PSYC 614 Infant Growth and Development
Semester course; 3 seminar hours. 3 credits. Prerequisite: PSYC 603 or permission of instructor. Sensory and behavioral capacities of the infant; cognitive, social, and emotional development in the first two years of life, with emphasis on the effects of early experience on function later in life. Consideration of the special problems associated with infant research and intervention programs.

PSYC 615/GRTY 615 Aging and Mental Disorders
Semester course; 3 lecture hours. 3 credits. The course deals with common psychological, disorders and problems of late life, their etiology, methods of evaluating psychological status, and intervention strategies that have been used successfully with older persons. Topics include epidemiology of psychological disorders and mental health service utilization; late-life stressors and crises; psychology of health, illness, and disability; techniques and procedures in the evaluation of the older adult; functional and organic disorders; institutionalization; individual, group, and family therapy; behavioral techniques; peer counseling and crisis intervention; and drugs and the elderly.

PSYC 616 Psychopathology
Semester course; variable hours. 1 or 3 credits. May be taken only one time for credit toward degree. Prerequisite: Permission of instructor. Clinical and experimental contributions to the field of psychopathology, with particular attention to the roles of learning and motivation in the development of behavior disorders.

PSYC 617 Sensation and Perception
Semester course; 3 lecture hours. 3 credits. The major phenomena of vision, audition, olfaction, gustation, and the skin senses. Psychophysics and the effects of sensory deficits. The relationship of levels of environmental energy to the psychological reactions of sensing and perceiving.

PSYC 618 Seminar in Personality
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. A detailed exploration of various approaches in personality. Contemporary issues in personality theory.

PSYC 619 Learning and Cognition
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing in psychology or permission of instructor. Covers principles and theories of learning and cognitive psychology from simple associative learning through memory, comprehension, thinking, and social behavior.

PSYC 620 Design and Analysis of Psychological Research
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: Undergraduate course in basic statistics or permission of instructor. An introduction to research design in psychology (e.g., logic behind various research designs, typical research problems). Review of principles of hypothesis testing, general linear model, analysis of variance including factorial designs with special emphasis on prior and post hoc comparisons, repeated-measures designs and mixed designs.
PSYC 621 Statistics in Psychological Research
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisite: PSYC 620. Extensive coverage of multiple regression/correlation analysis with applications in psychology. Survey of applications of multivariate statistical analyses in psychology.

PSYC 622 Physiological Correlates of Emotion
Semester course; 3 lecture/seminar hours. 3 credits. Research and theories of emotion emphasizing physiological bases, with special attention to neurological and endocrine systems. Applications to psychological functioning.

PSYC 623 Counseling Theories and Personality
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Overview in personality theory, techniques and current research in psychotherapies as they apply to counseling psychology. Includes descriptions of some brief psychotherapies and preventive interventions and stresses accountability in outcome of all interventions.

PSYC 624 Group Counseling and Psychotherapy
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: Permission of instructor. Review of major theories and current research in career development. Techniques of career counseling for individuals and groups. Emphasis on late adolescent, adult, and pre-retirement populations.

PSYC 626 Single-case Experimental Design for the Clinical Research Practitioner
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: Permission of instructor. Review of single-case design models that have utility for clinicians in evaluating their practice. Emphasis will be placed on the historical development of the field and on the main experimental design issues that are relevant to the conduct of single-case research.

PSYC 627 Research Methods in Clinical Psychology
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisites: PSYC 621 and graduate standing in clinical or counseling psychology, or permission of instructor. Examines the role of research in clinical psychology and experimental design issues in psychotherapy research.

PSYC 628 Psychology of Adolescence
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing in psychology or permission of instructor. Theories and research on the social, personality, and cognitive development of adolescents. Emphasis is placed on the development of identity and relationships with family and peers, within the contexts of home, school, work, and community. Variations in development related to cultural differences will also be the focus, but atypical behavior will be explored. Normal adolescent behavior will also be addressed. Current research ideas will be examined.

PSYC 629 Biological Basis of Behavior
Semester course; 3 lecture hours. 3 credits. Prerequisite: An undergraduate course in physiological psychology or permission of instructor. Theory and current experimental research on the physiological and neurological concomitants of behavioral variables.

PSYC 630 Social Psychology
Semester course; 3 lecture/seminar hours. 3 credits. Topics include social influence processes, person perception, affiliation and attraction, group processes, cultural influences on behavior, and conformity.

PSYC 632 Research Methods in Social Psychology
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisites: PSYC 621 and PSYC 630. Epistemological, methodological, technical, and ethical problems encountered during the scientific study of social psychological phenomena. Emphasizes practical experience in theory development, hypothesis derivation, research planning, data collection, reduction and analysis, and dissemination strategies.

PSYC 633 Group Dynamics
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: PSYC 630 or permission of instructor. Theoretical explanations and empirical research related to group formation, development, performance, and dissolution. Topics include obedience, conformity, group productivity, and leadership.

PSYC 634 Attribution and Social Cognition
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: PSYC 630. Analysis of the perceptual and inferential processes that influence the perceiver’s understanding of others’ traits and characteristics. Examines theoretical perspectives and current empirical studies of the intuitive use of behavioral data in making inferences concerning the causes of actions and the cognitive mechanisms that structure inferences about others’ qualities.

PSYC 635 Psychology of Health and Health Care in the Elderly
Semester course; 3 lecture hours. 3 credits. Presents health psychology models, theories, and issues relating to the etiology, course, and treatment of illness in the elderly. Covers older patient-practitioner interaction, compliance, late-life stress and illness, psychosocial issues in terminal care.

PSYC 636 Research Methods in Developmental Psychology
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: PSYC 621. Research designs, methods, ethical issues, and problems specific to developmental psychology. Cross-sectional, longitudinal, and sequential strategies. Statistical issues, multiple regression and choice of statistical designs appropriate for developmental research questions. Computer skills in organizing and analyzing data. Grant writing and scientific reporting.

PSYC 637 Operant Behavior
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: Graduate standing in psychology or permission of instructor. Presents an overview of the methodology, terminology, and phenomena unique to the experimental analysis of behavior. Topics include operant methodology, schedules of reinforcement, stimulus control, acquisition of behavior, conditioned reinforcement, punishment, scheduled-induced behaviors, and use of operant techniques in drug research.

PSYC 638 The Evolution of Psychological Systems
Semester course; 3 lecture hours. 3 credits. Prerequisite: Core course in student’s area of specialization or permission of instructor. A survey of the development and present state of various psychological systems. Current meta-theoretical and systematic issues in psychology.

PSYC 639 Research Methods in Biopsychology
Semester course; 1 lecture and 4 laboratory hours. 3 credits. Prerequisites: Permission of instructor. Methodological, technical, and ethical problems in biopsychology. Examples are design and use of circuits in behavioral sciences, stereotaxic surgery, histology, drug procedures, research design, data collection procedures, and data analysis.

PSYC 641/GRTY 641 Survey of Psychological Assessment and Treatment of the Older Adult
Semester course; 3 lecture hours. 3 credits. A combination didactic and skills training course; review of major treatment strategies and techniques for utilization with the older adult client with emphasis on group, individual, and psychopharmacological systems; evaluation of crisis intervention and consultation team approaches; lectures, demonstration, and classroom practice of actual treatment techniques.

PSYC 642/GRTY 642 Practicum in Clinical Geropsychology
Semester course; 1 lecture hour. 2 credits. Prerequisites: Graduate standing in psychology or permission of instructor. Basic psychometric concepts to prepare the student for subsequent evaluation instruments. Origins and logic of testing, standardization and reliability, and validity and principles of test development and construction.

PSYC 644 Individual Tests of Intelligence
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: Graduate standing in clinical or counseling psychology or permission of counseling or clinical psychology program. Examines the administration, scoring, interpretation, and research foundations of the major individual tests of intelligence. Emphasizes the Wechsler scales and the measurement of adult and child intelligence. Develops psychological report writing skills.
PSYC 645 Assessment of Personality
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: Graduate standing in clinical or counseling psychology, or permission of instructor. Psychiatry and psychology program and instructor. Examines use of objective and projective tests in assessment of personality. Emphasizes clinical interpretation. Minnesota Multiphasic Personality Inventory (MMPI), and the administration and clinical interpretation of the Rorschach and Thematic Apperception Test (TAT). Stress integrative report writing.

PSYC 646 Projective Techniques
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing in clinical or counseling psychology or permission of counseling and clinical program committee. Projective devices for the assessment of personality. Supervised administration, scoring, interpretation, and written reports of individually administered projective personality tests.

PSYC 647 Neuropsychological Assessment
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: Graduate standing in psychology and permission of instructor. Psychological assessment of brain-behavior relationships in the context of neurological or neuropsychological problems. Emphasis is on current modifications of Halstead’s tests and on the Reitan-Indiana Neuropsychological Battery for younger children. Laboratory requires supervised administration, scoring, and interpretations of neuropsychological test batteries.

PSYC 648 Behavioral Assessment of Clinicians in Action
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: Graduate standing in psychology and permission of instructor. Development, evaluation, use, and interpretation of behavioral approaches to the assessment of clinical problems, including self-monitoring, behavioral ratings, and direct observational assessment procedures. Both existing instruments and procedures for designing new instruments will be discussed.

PSYC 649 Clinical Assessment of Child Disorders
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: PSYC 643 and graduate standing in clinical psychology, or permission of clinical program committee and instructor. Administration and interpretation of intellectual and personality assessment instruments for children. Laboratory requires supervised administration, scoring, interpretation, and written reports of these assessment instruments.

PSYC 650 Advanced Child Psychopathology
Semester course; variable hours. 1 or 3 credits. May be taken only one time for credit toward degree. Principal childhood behavioral abnormalities: mental retardation, psychopathologies, speech and language problems, school-related behavioral problems, neurosis, psychosomatic disorders and juvenile delinquency. Genetic, prenatal, perinatal, and social-psychological factors related to etiology. Integration of assessment and treatment methods.

PSYC 651 Theories of Counseling and Interviewing
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: graduate standing in counseling or clinical psychology, and permission of instructor. Introduces basic principles of interviewing as they apply to theories and practice of psychotherapy and counseling. Laboratory requires video-taping of simulated counseling/psychotherapy session, modeled and role-played. Emphasizes skill development and demonstration, and evaluative interpersonal feedback.

PSYC 652 Child and Adolescent Psychotherapy
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: Graduate standing in psychology and permission of the instructor. Presents the major approaches to psychological interventions for children’s and adolescents’ behavioral and emotional disorders. Includes a review of empirical research evaluating the effectiveness of contemporary psychological interventions for specific disorders.

PSYC 653 Family Counseling and Therapy
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisites: PSYC 616, and PSYC 693 or PSYC 694, and PSYC 645; or permission of instructor. Emphasizes an applied approach to family assessment and therapy. Presents concepts of major approaches to family therapy and general systems issues. Emphasizes techniques of family therapy. Involves participants in role playing, demonstration, films, and case discussion.

PSYC 654 Marriage Counseling and Therapy: Theory, Practice and Research
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing in clinical or counseling psychology or permission of instructor. Surveys major theories of marital interaction and counseling (as distinct from family counseling). Students perform assessment batteries and interviews and practice selected techniques of marital counseling. Participation in a research project, either library, field, or experimental research, is required.

PSYC 655 Community Interventions: Development, Implementation and Evaluation
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Provides an understanding of the concepts community, prevention, and promotion and how interventions that adopt such a perspective differ from traditional psychotherapeutic interventions in their goals and targets. Explores how to critically evaluate research related to community and preventive interventions. Emphasizes consideration of issues in designing, implementing, and evaluating community intervention projects. Provides opportunities to conduct part of the intervention in a community setting.

PSYC 656 Structured Training Groups
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: Permission of instructor. Provides an introduction to the historical roots and basic assumptions of group training methods. The specific focus is on those structured, behavioral or psychotherapeutic approaches designed to be time limited and emphasize staff development or training needs of clients. Needs assessment, setting, program development and evaluation, consultation methods, and ethics are included as topics. Leadership styles and the composition of training grant proposals are developed and critiqued in the laboratory/clinical component of this course.

PSYC 659 Seminar in Consultation Psychology
Semester course; 3 credits. Prerequisite: Graduate standing in psychology or permission of instructor. Explores the theory and practice of psychological consultation using case materials, readings, and individualized projects. Covers conceptual models and role choices available for the consulting psychologist, common phases, principles, and practices found in the consultation process and program evaluation and consultation research methods and issues.

PSYC 660 Health Psychology
Semester course; 3 lecture hours. 3 credits. Prerequisites: PSYC 629 and graduate standing in psychology, or permission of instructor. Provides an overview of research and applications of the behavioral psychology with respect to the fields of medicine, health maintenance, and illness. Emphasizes the integration of theoretical research and applied issues in these areas. Surveys major topics in behavioral medicine, including psychophysiological disorders, compliance and adherence with health care regimens, psychological treatments of pain, behavioral pain and behavioral psychology, cardiovascular risk reduction, eating and sleeping disorders, behavioral pharmacology, biofeedback. Explores roles of psychologists.

PSYC 665 Psychodynamic Approaches to Psychological Treatment
Semester course; 3 credits. Prerequisite: Permission of instructor. Examines basic principles in conceptualization and treating clients from a psychodynamic perspective. Theoretical and clinical readings and case materials are used as a basis for an in-depth analysis of psychodynamic theories and practices within a seminar format.

PSYC 666 Crisis Intervention: Theory, Research and Practice
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: Graduate standing in psychology. Prerequisites: PSYC 665 and permission of instructor. Review of the development of the concept of psychological crisis and of intervention programs in a range of areas such as sexual assault, natural disasters, telephone hotlines, and medical emergencies. Relevant theory and data from community psychology, laboratory and applied research, sociology, and psychiatry will be considered.

PSYC 667 Behavior Therapy
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing in the psychology program or permission of instructor. Emphasizes group and individual approaches to the following general areas: observational techniques; counterconditioning and extinction procedures; techniques of positive and negative control; self-control procedures; use of modeling and role playing as therapeutic techniques; behavioral feedback and cueing procedures.

PSYC 668 Interpersonal Psychotherapy: Social Psychological Analysis
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: Permission of instructor. Analysis of counseling and psychotherapy as interpersonal influence processes. Applications of social psychological theories and research to the process of therapeutic change; identification of key aspects of the
change process and of how these aspects are embodied in current approaches and techniques of counseling and psychotherapy. Emphasis on experiential methods of studying change processes.

**PSYC 669 Interpersonal Psychotherapy: Communication Analysis**
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: Permission of instructor. Focus on the ethical principles of communication, theoretical formulation, techniques, and application of Gestalt therapy. Students will have the opportunity to practice and observe the techniques.

**PSYC 670 Seminar in Gestalt Therapy**
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Focus on the ethical principles of communication, theoretical formulation, techniques, and application of Gestalt therapy. Students will have the opportunity to practice and observe the techniques.

**PSYC 671 Readings and Research**
Semester course; 1-3 credits. May be repeated for a maximum of 9 credits. Prerequisite: Written permission of instructor. Individual study leading to the investigation of a particular problem in a systematic fashion under the supervision of a member of the faculty.

**PSYC 675 Ethical Principles of Psychology**
Semester course; 2 lecture hours. 2 credits. A discussion of some of the current problems of interest to psychologists. Particular emphasis on the ethical principles of psychology, and the dilemmas encountered in the teaching, research, and applied practice of psychology.

**PSYC 676 Personal Awareness in Multicultural Counseling**
Semester course; 2 seminar hours and 1 hour skills-building component. 3 credits. Prerequisite: Graduate standing in the counseling psychology doctoral program or permission of the instructor. Focus on (1) self-awareness in cross-cultural issues, (2) knowledge of cultural differences and (3) counseling skills with culturally different clients. This course will provide the theoretical and research knowledge base to complement students’ experiential training in multicultural issues. Building on the students’ knowledge of Western and non-Western psychology theories and practices, the course will help students in developing a theory of cross-cultural and multicultural counseling. The course will further focus on historical development of multiculturalism and examine existing research in this area.

**PSYC 677 Minority Issues in Mental Health**
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: Graduate standing in psychology or permission of instructor. Presents an overview of issues pertaining to the mental health of visual racial/ethnic groups (VREG) in the United States (i.e., African-Americans, Hispanics, Asian-Americans and Native Americans). Topic areas include research and psychological theories, assessment, diagnosis, ethnic identity acculturation, service utilization, the family, psychotherapy and training issues.

**PSYC 690 Research Practicum**
Semester course; 4 hours per credit. 1-3 credits. Available to graduate students in the psychology department with approval by their program committee. Provides the graduate student in psychology the opportunity to design and apply research skills under close faculty supervision. Involves research projects that progressively become more sophisticated as students increase their research skills.

**PSYC 691 Special Topics**
Semester course; 3 lecture/seminar hours. 3 credits. May be repeated for a maximum of 12 credits. Prerequisite: Permission of instructor. Theory, research, and techniques in specialized topics of current interest are presented.

**PSYC 693 Counseling Practicum**
Semester course; one-half day per credit. 1-3 credits. May be repeated for a maximum of 12 credits. Available only to graduate students in counseling psychology approved by the counseling program committee. A series of training experiences designed to facilitate progressively greater degrees of skill development in counseling psychology.

**PSYC 694 Clinical Practicum**
Semester course; one-half day per credit. 1-3 credits. May be repeated for a maximum of 12 credits. Available only to graduate students in clinical psychology approved by the clinical program committee. The graduate student in clinical psychology is given an opportunity to apply and practice theories and diagnostic and therapeutic skills with clients requiring psychological services. Careful supervision and evaluation of the student is provided. The practicum may be located at a clinic on campus or in a hospital or other agency off campus.

**PSYC 695 Practicum in Clinical or Counseling Supervision**
Semester course; 4 supervisory hours. 2 credits. May be repeated for a maximum of 6 credits. Credits earned do not count as course credits toward the degree. Prerequisites: permission of instructor, enrollment in graduate program in clinical or counseling psychology, completion of 12 hours of clinical (PSYC 694) or counseling (PSYC 693) practicum. This course is an opportunity to develop, apply, and practice psychotherapy supervision skills under the direct supervision of clinical or counseling faculty members.

**PSYC 696 Internship**
0.5 credit. Prerequisite: Approval of the director of the program involved. The internship is one-year, full-time assignment, under supervision and approved by the student’s program committee.

**PSYC 700 Grant Writing**
Semester course; 3 lecture hours. 3 credits. Prerequisites: two graduate courses in statistics or permission of instructor. Students are expected to present a topic identified with a pre-approved topic and develop a research proposal. Focuses on preparing an NIH grant application, using F31-F32 mechanisms (predoctoral or postdoctoral National Research Service Award) as a model. Course covers elements of a grant application, details of the grant review process, and key features of successful applications. Students prepare a research plan for their own application based upon their current work.

**PSYC 702/703 702/702 Causal Analysis for Organizational Studies**
Semester course; 3 lecture hours. 3 credits. Prerequisites: Graduate courses in statistics or permission of instructor. Focuses on conceptual and statistical issues involved with causal analysis with nonexperimental and experimental data. Course covers basic and advanced confirmatory factor analysis and structural equation techniques, with an emphasis on organizational and psychological applications.

**PSYC 795 Practicum in the Teaching of College Psychology**
Semester course; 3 credits. May be repeated. Prerequisites: Appointment as a graduate teaching assistant in psychology or permission of instructor. Students develop skills in the design and conduct of undergraduate courses in psychology through observation and supervised experiences: acquaints students with university, college, and department policies and resources in support of instruction; familiarizes students with disciplinary resources; assists students in evaluating personal strengths and weaknesses.

**PSYC 798 M.S. Thesis**
1-6 credits. May be repeated.

**PSYC 898 Doctoral Dissertation**
1-12 credits. May be repeated.

### Public Administration

**PADM 583 Effective Managerial Communications**
Semester course; 1 lecture hour. 1 credit. Describes and explains the communications process as it applies in public organizations. Acquaints students with the theoretical basis of interpersonal communications and with applied methodologies from a managerial perspective.

**PADM 584 Planned Organizational Change**
Semester course; 1 lecture hour. 1 credit. This course will explore the strategies and tactics of planned organizational change. Emphasis is placed on the change process in organized situations and on various strategies and tactics the manager may employ to achieve desired change in his or her organization.

**PADM 585 Power, Influence and Organizational Competence**
Semester course; 1 lecture hour. 1 credit. This course will explore the strategies and tactics of power and influence use in large-scale public organizations. A framework for use of influence strategies will be presented and tactical methodologies will be examined through case study and simulation.

**PADM 591 Topic Seminar**
Semester course; 3 lecture hours. 3 credits. Seminar in contemporary public administration issues.

**PADM 601 Principles of Public Administration**
Semester course; 3 lecture hours. 3 credits. Dynamics of governmental administration including administration in public decision making, communication, leadership, organizational models, and the social, economic, legal, and political milieu of administration.

**PADM 602 Public Administration Theory**
Semester course; 3 lecture hours. 3 credits. Examines historical and contemporary public administration theories and paradigms. Emphasizes the practical significance of such theories for both macro and micro issues in public administration.
PADM 603 Politics and Economics
Semester course; 3 lecture hours. 3 credits. Examines political and economic institutions and concepts as they affect and are affected by the public administration. Topics include microeconomics and the public sector; the interrelationship between the private and public sectors; macroeconomics concepts and related issues.

PADM 604 Comparative Public Institutions
Semester course; 3 lecture hours. 3 credits. Applies a comparative methodology to explore theories and models of public institutions in the United States and in selected developed and developing countries. Focuses on administrative structures and practices, with emphasis on the relationship between administrative practice and cultural, and political context. Institutions examined will be changed periodically to focus on interjurisdictional comparisons within the United States - at the local, state, and federal levels - as well as among other countries and the United States.

PADM 605/SOCY 605 Survey Research Methods
Semester course; 3 lecture hours. 3 credits. Prerequisites: SOCY 601, SOCY 602 and SOCY/STAT 608, or permission of instructor. Examines all major areas of survey research methodology including sampling, design, data collection methods, questionnaire design, data analysis, and data processing. Addresses problems specific to survey research, such as telephone interviewing, constructing large representative samples, and nonresponse rates.

PADM 606 Government Management Models
Semester course; 3 lecture hours. 3 credits. An examination of current thought and research on management theory and organizational design in government. Theory and research from diverse sources, i.e., political science, sociology, industrial psychology, and administrative science will be employed to provide each student with the macro conceptual framework necessary for development or refinement of effective public management skills.

PADM 607 Public Human Resource Management
Semester course; 3 lecture hours. 3 credits. The general concepts, principles, and techniques of personnel administration and employee relations as applied in governmental units and agencies.

PADM 609 Financial Management in Government
Semester course; 3 lecture hours. 3 credits. The general concepts, principles, and techniques of financial management as applied in governmental units and agencies. Students specializing in nonprofit agencies. Students specializing in nonprofit management in the principles of program management and in the public sector; examines approaches to strategic management, especially in terms of the role and behavior of top management, and provides an introduction to the analytic and process methods used in strategic planning and management.

PADM 622 Public Sector Budgeting
Semester course; 3 lecture hours. 3 credits. Prerequisite: PADM 609. Advanced theory and practice of public agency budgeting in the decision-making processes and its impact on policy-making. Topics include alternative budgeting systems, capital planning and budgeting, budget execution, budget analysis techniques, and revenue and expenditure forecasting.

PADM 623 Research Methods for Public Administration
Semester course; 3 lecture hours. 3 credits. Prerequisite for PADM 624. Introduction to the scope and methods of applied research for the public sector. Focuses on problem structuring through logical methods, exploring problems through observation and other methods of data collection, analyzing and summarizing findings using both qualitative and quantitative methods.

PADM 624 Research Methods for Public Administration
Semester course; 3 lecture hours. 3 credits. Prerequisite for PADM 624. Introduction to statistical methods for use in managerial decision making, policy analysis, and social science research. Descriptive and inferential statistics are explored through computations and using SPSS/PC computer software.

PADM 625 Public Policy Analysis
Semester course; 3 lecture hours. 3 credits. The examination of various methods for identifying and structuring public policy problems and issues, formulating and analyzing alternative responses, recommending policy actions for decision making, and designing and evaluating implementation plans and the means to monitor and evaluate the resulting policy outcomes.

PADM 626 Intergovernmental Relations
Semester course; 3 lecture hours. 3 credits. Focuses on various models of federalism and examines the pragmatic evolution of federal, state, and local intergovernmental relations in the United States. Topics include policy implementation and implications, fiscal transfers, and local government cooperation and conflict in the metropolis.

PADM 627 Workshop in Policy Analysis and Evaluation
Semester course; 3 lecture hours. 3 credits. Prerequisites: PADM 624 and PADM 625, or permission of the instructor. This course is project-oriented, emphasizing practical experience in the design and conduct of policy analysis or program evaluation studies. Emphasizes the political environment and client relationships.

PADM 628/ENVS 628 Environmental Policy and Administration
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. This course explores the relationship between environmental policy and the decision-making process, and examines the implementation of environmental programs. It includes an investigation of basic concepts that underlie environmental policy and the difficulties in attempting to apply them in a real-world setting. It also surveys a variety of tools and methodologies that may be useful in attempting to develop and implement environmental policy.

PADM 630/URSP 630 Strategic Planning and Management in the Public Sector
Semester course: 3 lecture hours. 3 credits. Explores the benefits and limitations of strategic planning and management in the public sector, examines approaches to strategic management, especially in terms of the role and behavior of top management, and provides an introduction to the analytic and process methods used in strategic planning and management.

PADM 637 Human Resources Management
Semester course; 3 lecture hours. 3 credits. Prerequisites: PADM 607 or equivalents. An examination of current thought, research, and personnel management theory and practice in government that is person-oriented is presented in this course. Topics include rank-in-the-person personnel systems; career development, executive personnel systems; forecasting human resource needs; individual-based performance evaluation; employee assistance programs; and special emphasis program.

PADM 642 Grants Management
Semester course; 3 lecture hours. 3 credits. Principles and practices of managing federal and state funds and implementing a grant-funded program. Topics include federal grant-making process, applying for a grant, developing grant accounting systems, joint funding, disputes, appeals and remedies, and close-out procedures.

PADM 650 Principles of Nonprofit Management
Semester course; 3 lecture hours. 3 credits. Explores the history, theories and dynamics of not-for-profit organizations in the United States, with focus on organizations with local or regional services areas. Emphasizes political, legal, cultural, and constituent environments; revenue generation; decision making, communications, leadership, and organizational models. Compares the mission and operations of nonprofit organizations, government organizations, and for-profit businesses in the delivery of services.

PADM 652 Administrative Law
Semester course; 3 lecture hours. 3 credits. The course considers the administrative process from the perspective of rule making and decision making within the framework of public agencies. It will examine the development of the law, the use and control over administrative discretion, legislative and judicial controls over the administrative process, and remedies for improper administrative acts.

PADM 654 Program Design and Evaluation in the Nonprofit Sector
Semester course; 3 lecture hours. 3 credits. Prerequisites: PADM 624 and PADM 625, or permission of instructor. Designed to train students of nonprofit administration and management in the principles of program design and evaluation. Students will be introduced to the principles of logical, political and ethical foundations of the program as well as practical research design and methodologies, both qualitative and quantitative.

PADM 656 Fund Development for the Nonprofit Sector
Semester course; 3 lecture hours. 3 credits. Students will study the multiple methods and sources for funding nonprofit organizations, the various methods for
identifying and securing funding resources and for differentiating among them. Sources of funding that will be explored include corporate, annual, planned giving, endowment, individual, major gift, the use of special events and direct mail. Grant writing will be explored in detail. Students will examine ethical issues related to fund raising as well as the stewardship of funds received.

PADM 657 Nonprofit Advocacy and Government Relations
Semester course; 3 lecture hours. 3 credits. Addresses the growth and expansion of the nonprofit sector's relationship to the government sector both in the United States and internationally. Students will study historical and current partnerships with and regulation by government entities. Students also will study the nonprofit organization's advocacy role on behalf of its missions and beneficiaries, the scope of permitted lobbying activities, the state's role in regulating speech by nonprofits and government funding of service delivery through religious-based organizations.

PADM 659 Financial Management for Nonprofit Organizations
Semester course; 3 lecture hours. 3 credits. Designed to introduce students to the financial practices of nonprofit organizations including budgeting, forecasting, accounting, auditing, and debt and cash management. The general concepts, principles and techniques of financial management will be studied in the context of the political, behavioral and social environments in which the nonprofit sector operates in order to determine the best manner for achieving the objectives of the nonprofit financial administrator/manager. This course may be substituted for the core course, PADM 609 Financial Management in Government, for students pursuing a nonprofit specialization.

PADM 660 Community Power Dynamics
Semester course; 3 lecture hours. 3 credits. Examination of the location of power in the American community, operational concepts and general methodological approaches defined, empirical findings based on various methodological approaches, conclusions on community political systems and power.

PADM 661 Nonprofit Law, Governance and Ethics
Semester course; 3 lecture hours. 3 credits. Examines fundamental governance issues in nonprofit corporations with a focus on boards of trustees and their fiduciary responsibilities as established by law as well as moral imperatives stemming from their actions on behalf of the public interest. The ethical dimensions of work in nonprofit organizations are explored with specific emphasis on risk management, tax liability and human resource management.

PADM 662 Advanced Topics in Revenue and Taxation
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 616 or permission of instructor. An advanced examination of governmental revenue and taxation policies, tax incidence, and alternative funding techniques.

PADM 664 Local Government Administration
Semester course; 3 lecture hours. 3 credits. An intensive examination of the major functional responsibilities with a special emphasis on the organization, standards, operational imperatives, interrelationship with other functions, and special management problems at the local level, including small and rural jurisdictions.

PADM 670 Advanced Public Financial Management
Semester course; 3 lecture hours. 3 credits. Prerequisites: PADM 609 and ECON 616, or permission of department. Brings together specialty aspects of public financial management such as economic and political implications, practical skill-building, operational financial administration issues and tactics, and accounting principles and approaches, and integrates these disparate segments of public finance. The emphasis is on policy-level implications and strategies of public financial management, management of the financial sector of public organizations.

PADM 675 Comparative Public Administration
Semester course; 3 lecture hours. 3 credits. Explores methodology, theories, and models used in comparative approach to public administration, functional processes of administration in selected developing and developed countries, and role of bureaucracy in development and nation building.

PADM 680 Executive Leadership Seminar
Semester course; 3 lecture hours. 3 credits. Explores aspects of current interest in leadership style, skills, and roles. This course allows students to explore areas of personal interest in contemporary public management leadership theory and practice and to share findings in seminar format.

PADM 681 Governmental Administrative Decision-making Processes
Semester course; 3 lecture hours. 3 credits. Identification of alternative decision making processes in public sector management environments. Choosing the proper method of the appropriate management-level theory and method of controlling administrative decisions within governmental organizations. Dealing with political, budgetary and personal constraints in achieving organizational goals.

PADM 682 Advanced Public Human Resources Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: PADM 607 or equivalent. Public personnel management is analyzed in process and systems perspectives, with specific emphasis on the interrelatedness of discrete system components with other systems. Attention is given to the integration of personnel elements through the development of feedback systems, positive and negative impacts' analyses, and personnel policy development and implementation.

PADM 683/PHIL 683 Administrative Ethics
Semester course; 2 or 3 lecture hours. 2 or 3 credits. A philosophical analysis into the problems of making ethical decisions, focusing on issues likely to confront the public administrator. Examples of such issues are equity in social services delivery; affirmative action; loyalty to the bureaucracy vs. "whistle blowing," and conflicts of interest between personal and public interest.

PADM 689 Seminar in Public Administration: Integration of Theory and Practice
Semester course; 3 lecture hours. 3 credits. Integration of public management and administration theory and practice; goal setting for professional growth and approaches to life-long continuing self-development; integration of theory, models, knowledge, skills, behaviors, values, ethics, and philosophy of public management and administration. This is a capstone, required course for M.P.A. students.

PADM 690 Reading Seminar
3 credits. Prerequisites: 24 credits in public administration or permission of instructor. A reading and writing intensive Internet course which may be taken in lieu of PADM 689. Students will read up to 15 newly published titles in public administration and related fields, write reviews of each and post them on the course Web site forum for peer review and critique.

PADM 691 Topics in Public Administration
Semester course; 1, 2 or 3 lecture hours. Variable credit. Course may be repeated with different topics as approved. Prerequisite: Permission of instructor. An in-depth study of a selected topic in public administration. See the Schedule of Classes for specific topics to be offered each semester.

PADM 693 Public Administration Practicum
3 credits. A professional internship in public service for those students without significant professional-level experience in a public agency.

PADM 697 Directed Research in Public Administration
Semester course; 1-6 credits. Prerequisite: Permission of instructor. Independent research into public administration problems, issues, applications, and theories related to student's field of concentration.

Religious Studies

REL S 592 Independent Study
Semester course; 1-4 credits. Determination of the amount of credit and permission of the instructor and department chair must be procured prior to registration for the course. Open only to graduate students. An independent study course to allow qualified graduate students to do research in an area of major interest.

Sociology

SOCY 500 Advanced Principles of Sociology
Semester course; 3 lecture hours. 3 credits. A comprehensive analysis of the concepts and techniques useful for understanding society and culture as well as the social processes and structures operant within these spheres.

SOCY 501 The Foundations of Sociological Theory
Semester course; 3 lecture hours. 3 credits. The foundations of the theoretical explanation of the social world is addressed from an historical and philosophical perspective. The emergence of contemporary sociological theory in the 19th and 20th centuries is reviewed.
SOCY 502 Contemporary Sociological Theory
Semester course; 3 lecture hours. 3 credits. A critical assessment is given of such contemporary theoretical orientations as functionalism, conflict theory, exchange theory, symbolic interactionism and phenomenology.

SOCY 508/STAT 508 Introduction to Social Statistics
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Introduction to statistical methods applicable in a variety of settings, with emphasis on nonexperimental data. Data description and analysis including chi-square and t-tests, using a statistical computing package. Not applicable toward M.S. in Mathematical Sciences, Sociology or Computer Science.

SOCY 524 Aging and the Minority Community
Semester course; 3 lecture hours. 3 credits. An analysis of the relationship between the aging process and American minority communities. In addition to the sociological factors, the course will examine demographic, physiological, and psychological aspects of minority aging. Attention will also focus on dominant social problems and federal policies toward the aged.

SOCY 601 Advanced Methods of Social Research
Semester course; 3 lecture hours. 3 credits. Prerequisites: SOCY 320 and SOCY/STAT 508 or equivalent. Research as a systematic process involving formulation of the problem, design of the research, field operation, the processing and analysis of data, and preparation of the research report. Also considered are critical analyses of current methods, administration of research projects, and the significance of research to social action.

SOCY 602 Applications of Advanced Research Methods
Semester course; 3 lecture and conference hours. 3 credits. Prerequisites: SOCY 601 and SOCY/STAT 608. The methods of developing a research project will be analyzed from the initial problem formulation, to the identification of research questions, theoretical framework, through research design, and procedures.

SOCY 603 Seminar in Population Studies
Semester course; 3 lecture hours. 3 credits. Analysis of fertility, mortality, and migration from a sociodemographic perspective. Special attention will be paid to sociological determinants of demographic processes and their interrelationships.

SOCY 604 Sociology of Work in Industry
Semester course; 3 lecture hours. 3 credits. Analyses of work relations and the social structures and mechanisms that govern and arise out of them and examination of the social problems that are inherent in the characteristics that make a society an industrial society.

SOCY 605/PADM 605 Survey Research Methods
Semester course; 3 lecture hours. 3 credits. Prerequisites: SOCY 601, SOCY 602 and SOCY/STAT 608, or permission of instructor. Examination of major areas of survey research methodology including sampling, design, data collection methods, questionnaire design, data analysis, and data processing. Addresses problems specific to survey research, such as telephone interviewing, constructing large representative samples, and nonresponse rates.

SOCY 607 Seminar in Racial and Ethnic Relations in America
Semester course; 3 lecture hours. 3 credits. A study of intergroup relations in such areas as housing and school desegregation, racism, minority and athletics, the emergence of white ethnic groups, and political systems, and the position of minorities in legal, economic, and medical institutions.

SOCY 608/STAT 608 Statistics for Social Research
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: SOCY/STAT 508 or permission of instructor. Statistical methods applied in social research. Topics include analysis of variance, correlation and regression, including stepwise methods, and the analysis of discrete data. Study of a statistical package, emphasizing manipulation of survey data sets. Not applicable toward M.S. in Mathematical Sciences or Computer Science.

SOCY 609 Seminar in the Family
Semester course; 3 lecture hours. 3 credits. Analysis of contemporary family life with an emphasis on the influence of social change. Consideration of current family crises and problems.

SOCY 610 Complex Organizations
Semester course; 3 lecture hours. 3 credits. A study of complex organizations in society with emphasis on the determinants and effects of organizational structure and process.

SOCY 611 Studies in the Community
Semester course; 3 lecture hours. 3 credits. The organization of the community with emphasis on major trends in urban development and growth. The interdependence of political, social, and economic geographic units. The need for cooperative planning and control.

SOCY 612 Seminar in the Sociology of Deviant Behavior
Semester course; 3 lecture hours. 3 credits. The nature and functions of deviance. Theories and problems of social control.

SOCY 613 Social Stratification
Semester course; 3 lecture hours. 3 credits. An in-depth analysis of status differentials in society (e.g., social class, prestige, and power).

SOCY 614 Seminar in the Sociology of Education
Semester course; 3 lecture hours. A sociological analysis of education as a social institution with an emphasis on methodological issues and policy implications.

SOCY 615 Seminar in Mass Communications
Semester course; 3 lecture hours. 3 credits. Some theoretical background in sociology is recommended. A sociological analysis of contemporary media and their interrelationships with social systems, media, and national development. Special emphasis on media as instruments of social and cultural change.

SOCY 620/CRJS 620 Seminar in Criminology
Semester course; 3 lecture hours. 3 credits. Examination and analysis of social, psychological, and economic theories and correlates of criminal behavior. Typologies of offenders.

SOCY 622 Theory Construction
Semester course; 3 lecture hours. 3 credits. A consideration of recent social theorists in which emphasis is placed on the logic of theory construction.

SOCY 623 Causal Analysis
Semester course; 3 lecture hours. 3 credits. Prerequisites: SOCY 602 and SOCY/STAT 608, or equivalent. An examination of the utility of causal reasoning in the social sciences and an introduction to causal modeling. Topics studied will include the development of theoretical linkages, recursive and nonrecursive path estimation, causal thinking and theoretical refinement, and policy analysis and system dynamics.

SOCY 624/GRTY 624 Community and Community Services for the Elderly
Semester course; 3 lecture hours. 3 credits. A conceptual/theoretical overview of community focusing on the ecological, psychological, and sociological dimensions of community and on communities of the aged.

SOCY 625 Urban Sociology
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing. A detailed analysis and examination of the social and ecological structures and processes of the modern city with primary emphasis on the macro-level organization of urban life.

SOCY 630 Social Psychology
Semester course; 3 lecture hours. 3 credits. Discussion and investigation of selected social psychological issues in sociology, as well as traditional and innovative methodology applied to these issues.

SOCY 640 Seminar in Political Sociology
Semester course; 3 lecture hours. 3 credits. Analysis of structures and processes of political organization. Examination of the creation and management of power, diffusion and regulation of conflict, and the politics of modernization and bureaucratization.

SOCY 645 The Sociology of Health and Illness
Semester course; 3 lecture hours. 3 credits. An examination of sociocultural factors in health and illness and the influence of social factors on recovery and rehabilitation. Special attention will be paid to the methodology found in current studies.

SOCY 646 Seminar in the Sociology of Mental Health and Disorder
Semester course; 3 lecture hours. 3 credits. Seminar in social organizational causes of clinical depression, schizophrenia, neurosis, and personality disorders. Focus is on prevention through social engineering and social policy. Impact of social change, sex roles, and socialization processes on rates of mental disorder emphasized.

SOCY 650 Theories of Social and Institutional Change
Semester course; 3 lecture hours. 3 credits. A study of social change with emphasis on institutional settings. Topics examined include alternative theoretical perspectives on change, structural sources of change, approaches to planned change, and the role and function of change agents.

SOCY 660 Seminar in the Sociology of Women
Semester course; 3 lecture hours. 3 credits. An analysis of the sociological basis for the
roles and status of women across cultures and the social forces that create and maintain gender hierarchy.

SOCY 690 Practicum in the Teaching of College Sociology
Semester course; 1 credit. Enables students to develop skills in the design and conduct of undergraduate courses in sociology through observation and supervised experiences. Credits not applicable toward the B.S. in Sociology.

SOCY 692 Independent Study
Semester course; 1-3 credits. A maximum of 6 credits may be submitted toward the master’s degree. Prerequisites: permission of instructor and graduate program committee.

SOCY 693 Applied Research Internship
Semester course; 1 lecture and 1 laboratory hours. 2 credits. May be repeated for credit one time. Provides graduate students with direct experiences in applied social research. Requires students to attend seminars to provide an academic framework for students’ participation in the research process. Utilizes laboratory work to provide a variety of experiences in the various aspects of research. Graded as pass/fail.

SOCY 698 M.S. Thesis
1-6 credits. May be repeated.

Spanish

SPAN 503 Spanish Communication
Semester course; 1-4 lecture hours. 1-4 credits. An intensive study of communication in Spanish. The content of this course will emphasize primarily oral, written, and listening skills.

SPAN 513 Spanish Civilization
Semester course; 1-4 lecture hours. 1-4 credits. Prerequisite: Functional fluency in Spanish since the class will be taught in Spanish. A comprehensive study of the civilization and culture of Spain and its global expressions.

Statistical Sciences

STAT 503 Introduction to Stochastic Processes
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 307 and STAT/MATH 309. A continuation of topics given in STAT/MATH 309. An elementary introduction to stochastic processes and their applications, including Markov chains and Poisson processes.

STAT 508/SOCY 508 Introduction to Social Statistics
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MATH 307. Probability, random variables and their properties, distributions, moment generating functions, limit theorems, estimators and their properties; Neyman-Pearson and likelihood ratio criteria for testing hypotheses.

STAT 523/BIOS 523 Nonparametric Statistical Methods
Semester course; 3 lecture hours. 3 credits. Prerequisites: Any two courses of statistics or permission of instructor. Estimation and hypothesis testing when the form of the underlying distribution is unknown. One- and two-sample problems. Tests of randomness, Kolmogorov-Smirnov tests, analysis of contingency tables and coefficients of association.

STAT 541 Applied Statistics for Engineers and Scientists
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 200-201 or equivalent, and a working knowledge of computers. An introduction to applied statistics intended primarily for students in mathematical sciences, engineering and the Commonwealth Graduate Engineering Program. The fundamental ideas of the collection and display of information, descriptive statistics and exploratory data analysis, elementary probability theory, frequency distributions and sampling are covered. Other topics include tests of hypotheses and confidence intervals for one and two sample problems; ANOVA principles of one-factor experimental designs including randomized complete block designs, fixed and random effects and multiple comparisons; linear regression analysis; control charts; contingency tables and goodness-of-fit. Students may receive degree credit for only one of STAT 541, STAT 543 or BIOS 533.

STAT 543/BIOS 543/PMCH 543 Statistical Methods I
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing, or one course in statistics and permission of instructor. Basic concepts and techniques of statistical methods, including: the collection and display of information, data analysis and statistical measures; variation, sampling and sampling distributions; point estimation, confidence intervals and tests of hypotheses for one and two sample problems; principles of one-factor experimental design, one-way analysis of variance and multiple comparisons; correlation and simple linear regression analysis; contingency tables and tests for goodness of fit. Students may not receive degree credit for both STAT 541 and STAT 543. STAT 543 is not applicable toward the M.S. degree in mathematical sciences or the M.S. degree in computer science.

STAT 544/BIOS 544 Statistical Methods II
Semester course; 3 lecture hours. 3 credits. Prerequisite: One of the following: STAT 314, 541, 543 or equivalent. Advanced treatment of the design of experiments and the statistical analysis of experimental data using analysis of variance (ANOVA) and multiple-regression. Includes the use of a statistical software package for data analysis.

STAT 591 Topics in Statistics
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisite: Permission of instructor. Course open to qualified undergraduates. Selected topics in statistics.

STAT 608/SOCY 608 Statistics for Social Research
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: STAT/SOCY 508 or SOCY 214 or permission of instructor. Statistical methods applied in social research. Topics include analysis of variance, correlation and regression, including stepwise methods, and the analysis of discrete data. Study of a statistical package, emphasizing manipulation of survey data sets. Not applicable toward M.S. in Mathematical Sciences or Computer Science.

STAT 613-614 Stochastic Processes
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: MATH 508 and STAT 514. Introduction to the theory and applications of stochastic processes. Random walks, Markov processes, queuing theory, renewal theory, birth-death and diffusion processes. Time series, spectral analysis, filter, autocorrelation.

STAT 623 Discrete Multivariate Analysis
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 543 or permission of instructor. Methods for the analysis of contingency tables. Emphasis on social and biomedical applications of the general log-linear model.

STAT 626 Complex Sampling Designs and Variance Estimation
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 544 and 514. The analysis of data from surveys that use multistage samples, and connections to the analysis of observational studies and experiments with missing data. Computer intensive methodologies such as the jackknife and bootstrap will be introduced and applied to the problem of variance estimation in these diverse settings.

STAT 642 Design and Analysis of Experiments
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 543 or permission of instructor. An introduction to the design and analysis of experiments. Topics include the design and analysis of completely randomized designs, randomized block designs, incomplete block designs, fractional factorial designs, nested designs and split-plot designs and response surface designs. Students will complete and present a research project on an advanced topic in experimental design. Applications involve the use of a statistical software package. Students may receive credit for only one of STAT 642, STAT 544 or BIOS 554.

STAT 643 Applied Linear Regression
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 200-201, STAT 212 and MATH 310 or equivalents. An introduction to the concepts and methodology of linear regression analysis. Topics include simple linear regression, multiple linear regression, the impact of model misspecification, model selection criteria, residual analysis, influence diagnostics, diagnostic plots, multicollinearity, transformations and response surface methodology. Applications involve the use of a statistical software package.

STAT 644 Advanced Regression
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 643 or equivalent. Theoretical development and advanced applications of the general linear regression model and nonlinear regression models. Topics include an overview of multiple linear regression, generalized least squares and weighted regression, procedures for diagnosing and combating multicollinearity,
3 credits for an expository thesis or a total of 3 or 6 credits may be applied to the M.S. in Statistics. Hours to be arranged. 1-3 credits. A total of 3 credits is required. STAT 698 Thesis presentation to the supervising faculty. Research culminates with an oral presentation that significantly extends present coverage.

Individual research and study in an area not covered in the existing courses. Prerequisite: Graduate standing. Supervised research culminates with an oral presentation that significantly extends present coverage. 1-3 credits. A total of 3 credits per semester is required. STAT 694/OPER 694 Systems Reliability Analysis. Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 541 or equivalent or permission of instructor. An introduction to engineering reliability and risk analysis, specifically failure data analysis, maintenance problems, system reliability and probabilistic risk assessment. Applications in computer science and engineering will include stochastic characterization of wear in hardware systems and the development of failure models for software systems.

Decision problems such as the optimal maintenance of repairable systems and optimal testing policies for hardware and software systems will be examined. The analysis of risk through fault trees, event trees and accident precursor analysis will also be discussed.

STAT 649/OPER 649 Statistical Quality Control. Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 541 or equivalent, or permission of instructor. Demonstrates how statistics and data analysis can be applied effectively to process control and management. Topics include the definition of quality, its measurement through statistical techniques, variable and attribute control charts, CUSUM charts, multivariate control charts, process capability analysis, design of experiments, and classical and Bayesian acceptance sampling. Statistical software will be used to apply the techniques to real-life case studies from manufacturing and service industries.

STAT 691 Special Topics in Statistics. Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for credit. Prerequisite: Permission of instructor. A detailed study of selected topics in statistics.

STAT 697 Directed Research. Semester course; variable hours. 1-3 credits per semester. May be repeated for credit. Prerequisite: Graduate standing. Supervised individual research and study in an area not covered in the present curriculum or in one that significantly extends present coverage. Research culminates with an oral presentation and submission of a written version of this presentation to the supervising faculty member.

STAT 698 Thesis. Hours to be arranged. 1-3 credits. A total of 3 or 6 credits may be applied to the M.S. in Mathematics. (A total of 3 credits for an expository thesis or a total of 6 credits for a research thesis.) May be repeated for credit. Prerequisite: Graduate standing. Independent research culminating in the writing of the required thesis as described in this bulletin. Grade of “S,” “U” or “F” may be assigned in this course.

Urban Studies and Planning

URSP 517 Historic Preservation in Planning. Semester course; 3 lecture hours. 3 credits. The course surveys the process of historic preservation in the United States. The process involves the evaluation of sites, identification of architectural styles, the adaptive use of sites and structures, and the various sources available for implementing preservation proposals in government or the private sector. Preservation is considered as a tool in the planning process; and its application to neighborhoods, downtowns, and other city districts will be considered.

URSP 521/GEOG 521/ENVS 521 Introduction to Geographic Information Science. Semester course; 2 lecture and 2 laboratory hours. 3 credits. An introduction to creating and using geographically referenced databases for urban and environmental analysis and planning. Includes geographic and remote sensing data structures, global positioning systems, spatial analysis, geographic data standards, public domain software and data resources, and principles of cartography design. Lab exercises in the use of geographic information systems software tools.

URSP 525 Site Planning and Graphics. Semester course; 3 lecture hours. 3 credits. Addresses the environmental impacts and capacity of environmental systems in relation to the site requirements of various urban and rural situations. Introduces the use of graphics as an aid in presenting and analyzing planning and design ideas, maps and plans.

URSP 541 Urban Public Policy-making Processes. Semester course; 3 lecture hours. 3 credits. Discusses the politics of urban life. Examines the physical, demographic and economic environments in which conflict resolution occurs, as well as the actors on the local, state and federal levels that participate in the political process.

URSP 552 Urban Transportation Systems. Semester course; 3 lecture hours. 3 credits. An examination of urban transport systems, traffic, mass transit and new concepts for moving people and goods.

URSP 567 The American Suburb. Semester course; 3 lecture hours. 3 credits. Provides students with an understanding of the suburban movement in America, the elements of suburban growth and an awareness of current and emerging approaches to suburban planning and design. Includes neotraditional design, transit oriented developments, and master planned communities. A working knowledge of the U.S. Census is needed for some assignments.

URSP 605 Urban Planning History. Semester course; 3 lecture hours. 3 credits. Discusses the historical context of planning solutions to contemporary urban problems by examining the rich planning tradition since the mid-nineteenth century in the U.S. Significant plans, people and movements in the history of planning are discussed in relation to the evolving traditions of the profession.

URSP 610 Introduction to Planning. Semester course; 3 lecture hours. 3 credits. Introduces students to the planning profession. Provides an overview of the urban system and the history of planning, and covers the basics of comprehensive planning, including the context, process, agents, methods, components, and implementation. Prepares students for taking more specialized planning courses by introducing the sub-areas of planning, such as transportation planning, land use planning, environmental planning, housing, and urban design.

URSP 611 Principles of Urban Design. Semester course; 3 lecture hours. 3 credits. Principles of urban design at the micro- and macro-scale. Expression of planning objectives in physical design, with emphasis on the relationship between urban design at various scales and the needs of individuals and groups.

URSP 623 Planning Information Systems. Semester course; 2 lecture and 2 laboratory hours. 3 credits. Introduces students to data sources and database management for planning, including use of geographic information systems (GIS) in planning. An overview of database structures, public domain software and data resources, descriptive statistical analysis, graphic presentation of data, and principles of cartographic design. Laboratory exercises using GIS software and public domain data to describe communities and identify planning issues.

URSP 624 Demographic Analysis in Planning. Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: URSP 623. Applies parametric and nonparametric analysis to census and other public domain data. Employs population projection techniques and survey methods to analyze community planning needs.

URSP 626/GEOG 626 GIS Applications for Planners. Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: URSP 623. Examines in detail Geographic Information Systems.

URSP 628 Land Use Planning. Semester course; 3 lecture hours. 3 credits. Introduces students to the context, substance, practical skills, and implementation of land use planning. Covers such topics as land capacity, land use system and design, land use controls, state and regional growth management, resource land preservation, rural growth management, urban containment, and facility planning.

URSP 630/PADM 630 Strategic Planning and Management in the Public Sector. 3 lecture hours. 3 credits. Explores the benefits and limitations of strategic planning and management in the public sector. Provides an introduction to the analytic and process methods used in strategic planning and management.

URSP 632 Theories and Problems in Planning. Semester course; 3 lecture hours. 3 credits. Examines major traditions in the theory of...
planning in the context of actual planning processes and outcomes. Explores in depth the political, economic, and institutional constraints to effective planning and plan implementation. Discusses the planners' ethical dilemmas.

**URSP 635 Legal and Legislative Foundations of Planning**
Semester course; 3 lecture hours. 3 credits. Delineates the legal and legislative basis for planning at local, state, and federal levels. Judicial precedents in land use controls and environmental protection are investigated, including private controls, traditional zoning, administration of zoning ordinances, new flexible zoning concepts, development timing and growth controls, exclusionary land use practices, subdivision controls, and eminent domain regulations for environmentally sensitive areas, and environmental review.

**URSP 641 Citizen Participation and Negotiation**
Semester course; 3 lecture hours. 3 credits. Studying the theory and practice of citizen participation and negotiation, planners learn to work with citizens in a democratic process while practicing respect for differing views.

**URSP 643 Housing Policy**
Semester course; 3 lecture hours. 3 credits. Examines federal, state, and local housing policy. Discusses the issues of affordable housing, homelessness, and the private sector's contribution to housing.

**URSP 647 Adaptive Reuse of Buildings**
Semester course; 3 lecture hours. 3 credits. Describes from a public sector perspective identification for new uses, evaluation of benefits and preparation of implementation proposals for recycling older buildings. Discusses methods used to develop the necessary design guidelines as well as analyze these opportunities that can be a catalyst for urban revitalization.

**URSP 650 Environmental Planning**
Semester course; 3 lecture hours. 3 credits. Examines the impact of urban activities on the natural environment. Discusses federal, state, and local laws and policy governing air, water, waste, noise, and the natural processes of earthquakes, landslides and floods.

**URSP 652 Environmental Analysis**
Semester course; 1 lecture and 4 laboratory hours. 3 credits. Prerequisite: URSP 650. Familiarizes students with methods to carry out an environmental analysis. Provides a deeper understanding of environmental issues.

**URSP 654/ENVS 654/BIOL 654 Environmental Remote Sensing**
Semester course; 3 lecture hours. 3 credits. Prerequisite: URSP/ENVS 521 or equivalent. The course provides a basic and applied understanding on the use of digital remote sensor data to detect, identify and characterize earth resources. Students are required to demonstrate an understanding of the spectral attributes of soils, vegetation and water resources through various labs involving both image- and non-image-based optical spectral data.

**URSP 662 Foundations for Development Planning**
Semester course; 3 lecture hours. 3 credits. Introduces public planners to the nature and development of the urban economy. Uses case study analysis of an economy's industrial structure, labor market, and other features. Considers the roles of public planners in maintaining a healthy economy.

**URSP 664 Urban Economic Development Policy**
Semester course; 3 lecture hours. 3 credits. Prerequisite: URSP 662. Examines the economic development planning and implementation processes through theory and case studies in urban settings. Special topics include economic development institutions and practices, small business development programs, labor force development, community-based development, and sustainable development strategies.

**URSP 666 Urban Commercial Revitalization**
Semester course; 3 lecture hours. 3 credits. Examines renewal of declining commercial areas in cities and towns as tools in the planning process. Discusses and applies through fieldwork, market studies and other analysis methods, strategies for revitalization, public and private project financing and development.

**URSP 681 International Urban Policy and Planning**
Semester course; 3 lecture hours. 3 credits. Offers a comparative analysis of planning practices and policies in both developing and developed countries. Covers such topics as local implications of globalization, regional development strategies, urban governance and management, urban economic policies, sustainable development and urban infrastructure and shelter delivery.

**URSP 684 Planning Practicum Seminar**
Semester course; 1, 2 or 3 credits. Required individual students to apply theory and methodology gained from the core courses to solve selected planning problems. With the consent of instructor and department chair, URSP 684 Thesis or Projects is an acceptable substitute. Extended time may be granted with a grade of "PR." Final grade of "A," "B," "C," "D" or "F" will be awarded upon completion.

**URSP 691 Topics in Urban and Regional Planning**
Semester course; 1, 2 or 3 credits. Prerequisite: Because of the changing subject matter to be treated in this course, permission of the instructor is required. Students will have an opportunity to examine in detail some questions of significance in the field of urban and/or regional planning. See the Schedule of Classes for the specific topics to be offered each semester.

**URSP 761 Planning Studio I**
Semester course; 1 lecture and 4 laboratory hours. 3 credits. Prerequisites: All core courses except URSP 762 and 794. Involves students as a group in a community-based planning project.

**URSP 762 Planning Studio II**
Semester course; 1 lecture and 10 laboratory hours. 6 credits. Prerequisite: URSP 761. Requires individual students to apply theory and methodology gained from the core courses to solve selected planning problems. With the consent of instructor and department chair, URSP 764 Thesis or Projects is an acceptable substitute. Extended time may be granted with a grade of "PR." Final grade of "A," "B," "C," "D" or "F" will be awarded upon completion.

**URSP 764 Thesis or Projects**
2-6 credits. Prerequisites: Appropriate research methods course and permission of instructor. Planning, preparation, completion, and presentation of a thesis or project. URSP 764 is an acceptable substitute for URSP 762 Planning Studio II. Consent of instructor and department chair required for this substitution.

**URSP 794 Planning Practicum Seminar**
Semester course; 3 credits. Provides an opportunity for a structured analysis of the student's internship experience. Professional skills are enhanced through lectures, assignments and discussions.

**URSP 797 Directed Research**
1-3 credits. May be repeated for a maximum of 6 credits. Prerequisites: Permission of instructor and graduate standing. Independent research into planning problems, issues, and theories.
School of Allied Health Professions

Alleg Health Professions

ALHP 573 Teaching in Health Professional Schools
Semester course; 3 lecture hours. 3 credits. Study of the relationships between health education and higher education in general, current essentials, standards in education for the health professions and theoretical approaches to the implementation of these standards in both academic and clinical learning. Emphasis will be placed on modes of adapting to future needs of the professions.

ALHP 582 Supervision in the Allied Health Professions
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Study of the supervisory process and staff development, training in communication and interpersonal skills, and public relations within the health facility.

ALHP 591 Special Topics
Semester course; 1-4 credits. Prerequisite: Permission of instructor. Interdisciplinary study through lectures, tutorial study or independent research of selected topics not provided in other courses.

ALHP 594 Health Education Practicum
Semester course; 1 lecture and 4 laboratory hours. 1-6 credits. Prerequisite: ALHP 573. Preparation, presentation and evaluation of selected educational experiences in the appropriate graduate program. Section 01: General; Section 02: Nurse Anesthesia; Section 03: Clinical Laboratory Sciences.

ALHP 596 Supervisory and Administrative Practicum in Allied Health Clinics
Semester course; 60 clinical hours per credit. 1-9 credits. Prerequisite: Permission of instructor. This course is designed for the student who will be assuming supervisory and administrative roles. Areas to be covered include clinical personnel management, budgeting and ordering of materials and equipment, consultation with physicians, developing and troubleshooting clinical methods, designing job descriptions and implementing quality control programs. Section 01: Clinical Laboratory Sciences; Section 02: Physical Therapy.

ALHP 701 Health Services Delivery Systems
Semester course; 3 credits. Examines the structure and function of the U.S. health-care delivery system. The concepts and processes of health and illness, the institutional and individual providers of health services and related theory. Focuses on interdisciplinary care. Emphasizes meeting the unique needs of ethnically and culturally diverse populations.

ALHP 702 Finance and Economic Theory for Health Care
Semester course; 3 credits. Focuses on foundational concepts of micro-economic theory and their application in analyzing health care; understanding the structure and dynamics of health-care markets; and on monitoring and controlling the allocation of resources within health organizations. Emphasizes each of the health-care disciplines and how finance and economics affect the practice of delivery and evaluation.

ALHP 708 Ethics and Health Care
Semester course; 3 credits. Applies the principles of bioethics and health-care ethics to develop a more informed understanding of ethical decision making in the formulation of health-care policy as well as within the clinical environment. Focuses on utilizing and searching biomedical ethics literature, current issues in biomedical ethics, the discipline and process of ethical reflection and case consultation.

ALHP 712 Curriculum and Communication Design for Health Care Professionals
Semester course; 3 lecture hours. 3 credits. Required course. Examines various aspects of curriculum development, including instructional design and use of multimedia technology for teacher-learner communication and learner growth and development pertinent to doctoral education. Covers relevant learning theories in higher education and implications on curriculum design. Requires students to develop a Web-based interactive, multimedia course.

ALHP 716 Grant Writing and Project Management in Health Related Sciences
Semester course; 3 credits. Examines fundamentals of allied health grant writing and proposal preparation in the health related sciences, including funding source determination, understanding of RFP, basic elements of a proposal, proposal review procedures and allocation processes. Requires development of a complete proposal and critique of emerging proposals.

ALHP 718 Health Informatics
Semester course; 3 credits. Examines current information and management systems from an allied health sciences perspective. Emphasizes knowledge representation in health care, information needs, storage and retrieval, clinical information systems, standards of health information management and the evaluation of information management systems. Stresses the efficient and innovative use of technology.

ALHP 760 Biostatistical Methods for Health Related Sciences
Semester course; 3 credits. Deals with data in the health field. Elective course.

ALHP 761 Health Related Sciences Research Design
Semester course; 3 credits. Examines basic concepts and techniques of statistical methods, including the collection and display of information, data analysis and statistical measures; variation, sampling and sampling distributions; point estimation, confidence intervals, and tests of hypotheses for one and two sample problems; principles of one-factor experimental design, one-way analysis of variance and multiple comparisons; and correlation and regression analysis.

ALHP 762 Multivariate Statistical Methods for Health Related Sciences Research
Semester course; 3 credits. Examines multivariate statistical analysis and evaluation research methods with application to health related science research. Emphasizes data reduction techniques, factor analysis, principle components, discriminant analysis and logistic regression to analyze data in the health field.

ALHP 763 Clinical Outcomes Evaluation for Health Related Sciences
Semester course; 3 credits. Prerequisites: ALHP 760, 761 and 762. Prepares students to design, implement and interpret studies that evaluate the outcome and effectiveness of health services delivery. Emphasizes identification of emerging trends in health related sciences research, identification of meaningful research questions based on existing information and the use of primary and secondary data to assess outcomes.

ALHP 764 Advanced Methods for Health Sciences Research
Semester course; 3 credits. Examines the application of multivariate statistical analysis and evaluation methods to health related sciences research. Emphasizes advanced statistical methods (e.g., LISREL, Event History Analysis) and design to analyze panel data in the health field. Elective course.

ALHP 781 Doctoral Seminar in Health Related Sciences
Semester course; 3 credits. Prerequisite: Permission of instructor. Student’s desired topic of study must be identified and approved prior to enrollment. Studies specific topics in the area of the student’s specialty track.

ALHP 792 Independent Study
Semester course; 1-6 credits. May be repeated for a maximum of 6 credits. Prerequisite: Permission of instructor. Offers special individual study or research leading toward investigation in specialty track. Conducted under the guidance of a faculty adviser.

ALHP 793 Research Practicum
Semester course; 3 credits. Offers supervised investigation of selected problems in the area of the student’s specialty track. Includes conducting and analyzing field research.

ALHP 890 Dissertation Seminar
Semester course; 3 credits. Special individual study or research leading toward investigation in specialty track. Conducted under the direction of a faculty adviser.

ALHP 899 Dissertation Research
Semester course; variable hours. Variable credit. Minimum of 9 semester hours required for Ph.D. Prerequisites: Completion of required course work and comprehensive examination. Covers dissertation research under the direction of a faculty adviser.

Clinical Laboratory Sciences

CLLS 500 Concepts and Techniques in Clinical Laboratory Science
Semester course; 3 lecture and 2 laboratory hours. 3 credits. Prerequisite: Permission of instructor. Restricted to candidates in the categorical master’s program. Presents the basic theoretical concepts, laboratory techniques and skills employed in the
areas of clinical chemistry, hematology, immunohematology and microbiology.

**CLLS 501 Instrumental Methods of Analysis I**
Semester course; 2 lecture and 4 laboratory hours. 2-4 credits. Prerequisite: Permission of instructor. Study of modern research and clinical laboratory instrumentation and procedures. Principles, theory and comparison of laboratory instruments are discussed along with factors affecting their operation. Laboratory exercises are designed to demonstrate the practical applications of the instruments in the research and clinical laboratory. Areas covered include basic electronics, principles of photometry, spectrophotometry, fluorometry, flame emission photometry, atomic absorption spectrophotometry and computerized instrumentation.

**CLLS 502 Instrumental Methods of Analysis II**
Semester course; 2 lecture and 4 laboratory hours. 2-4 credits. Prerequisite: Permission of instructor. Study of modern research and clinical laboratory instrumentation and procedures. Principles, theory and comparison of laboratory instruments are discussed along with factors affecting their operation. Laboratory exercises are designed to demonstrate the practical applications of the instruments in the research and clinical laboratory. Areas covered include basic electronics, principles of photometry, spectrophotometry, fluorometry, flame emission photometry, atomic absorption spectrophotometry and computerized instrumentation.

**CLLS 508 Laboratory Diagnosis of Infectious Diseases**
Semester course; 3 lecture hours. 3 credits. Applies an organ system approach to the laboratory diagnosis of infectious diseases. Emphasizes diagnostic methods to verify infection by identification of pathogenic microorganisms and includes related diagnostic microbiology laboratory cases. Utilizes a distance learning format.

**CLLS 580 Principles of Education/Management**
Semester course; 2 lecture and 2 practicum hours. 1-3 credits. Introduces fundamental educational theories and practice, principles of management and employee relations and health-care issues from a global perspective with an emphasis on multicultural diversity. Stresses the application in the clinical laboratory. Requires a practicum in education and in management following the completion of the didactic portion.

**CLLS 595 Clinical Practicum**
Semester course; 80-320 clock hours. 1-4 credits. Prerequisite: At least one of the following: CLLS 301-302, 306 and 310, 307-308, 311-312, or by permission of instructor. Individual participation in a hospital laboratory in a selected specialty area: clinical chemistry, hematology, microbiology or immunohematology. Students gain practical experience in the performance of procedures and use of instruments by working with the clinical staff. After gaining competence, the students are expected to properly sign out routine laboratory work under supervision. Based on advisor’s recommendation and student’s past experience, the course may be taken for less than four credits. Graded as pass/fail.

**CLLS 600 Advanced Concepts in Clinical Laboratory Sciences**
Semester course; 3 lecture hours. 3 credits. Restricted to students enrolled in Accelerated M.S. Program. Advanced study of the principles of clinical laboratory sciences and the pathophysiological correlation of laboratory data to disease interpretation. Includes a review of laboratory information systems. Focuses on the applications of laboratory data and techniques to solve clinical and methodological problems.

**CLLS 601 Theoretical Blood Banking**
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. A comprehensive study of the blood groups in man, including biochemistry, genetics and clinical significance. Topics relating to problems with antibodies to the blood group antigens are discussed.

**CLLS 602 Molecular Diagnostics in Clinical Laboratory Sciences**
Semester course; 3 lecture hours. 3 credits. Restricted to students in the M.S. in Clinical Laboratory Science masters track or permission of instructor. Provides the basic principles and techniques of molecular diagnostics and information for establishing a molecular diagnostics laboratory. Examines the utilization of molecular techniques in the clinical laboratory for patient diagnosis and therapy. Emphasizes the use of these techniques in the areas of immunology, microbiology, hematology/oncology, and inherited genetic disorders.

**CLLS 605 Advanced Hematology**
Semester course; 2 lecture and 2 laboratory hours. 2-4 credits. Prerequisite: Permission of instructor. Discusses advanced laboratory techniques used to analyze blood dyscrasias and hemostatic disorders. Students also may perform related laboratory tests.

**CLLS 610 Interpretive Clinical Hematology**
Semester course; 2 lecture hours. 2 credits. Prerequisite: Permission of instructor. Principles of hematopoiesis and related pathological and pathophysiological correlation of hematological disorders are discussed.

**CLLS 690 Clinical Laboratory Sciences Seminar**
Semester course; 1 lecture hour. 1 credit. Presentation and discussion of current research and topics of interest by the departmental faculty, graduate students and visiting lecturers.

**CLLS 691 Special Topics in Clinical Laboratory Sciences**
Semester course; 1-4 credits. This course provides for lectures, tutorial studies and/or library assignments in specialized areas not available in formal courses or research training.

**CLLS 694 Molecular Diagnostic Practicum I**
Semester course; 640 clock hours. 8 credits. Prerequisite: CLLS 602. Restricted to advanced M.S. degree students or permission of instructor. Provides direct observation and practice in a molecular diagnostics laboratory with emphasis on nucleic acid extraction and molecular amplification techniques. Develops proficiency at performing, analyzing and reporting test results. Graded as pass/fail.

**CLLS 695 Molecular Diagnostic Practicum II**
Semester course; 320 clock hours. 4 credits. Prerequisites: CLLS 602 and CLLS 694. Restricted to advanced M.S. degree students or permission of instructor. Provides direct observation and practice in molecular diagnostics laboratory. Focuses on molecular hybridization and human identity analyses. Develops proficiency at all stages of nucleic acid analyses including performing, analyzing and reporting test results. Introduces practice issues involved in management of a molecular diagnostics laboratory. Graded as pass/fail.

**CLLS 696 Advanced Blood Bank Practicum**
6 laboratory hours. 2 credits. Prerequisite: CLLS 601. A laboratory course with practical experiences in research and management in an accredited blood bank. Requires a practicum in education and in management following the completion of the didactic portion.

**Gerontology**

**GRTY 410 Introduction to Gerontology**
3 credits. A survey of the field of aging with attention to physical, psychological, social, economic and cultural ramifications of age.

**GRTY 501 Physiological Aging**
3 credits. This course is taught at an introductory level in contrast to the more substantive background required for GRTY 601. Distinguishes between normal aging and those chronic illnesses often associated with aging in humans. This course would be valuable to those interested in the general processes of human aging.

**GRTY 601 Biological and Physiological Aging**
3 credits. Biological theories of aging; cellular, physical, systemic and sensoric change; health maintenance.

**GRTY 602/PSYC 602 Psychology of Aging**
Semester course; 3 seminar hours. 3 credits. Prerequisite: Permission of instructor. Students must complete social sciences research methods before taking this course. Psychological adjustment in late life; special emphasis on personality, cognitive and emotional development; life crises associated with the aging process.

**GRTY 603 Social Science Research Methods Applied to Gerontology**
3 credits. Prerequisite: Graduate statistics. Application of social science methods and techniques to study of the aged; data sources; types of problems encountered; data analysis; research reporting; use of research findings.

**GRTY 604 Problems, Issues and Trends in Gerontology**
3 credits. Application of knowledge in analysis of problems confronting aged persons; social issues and legislation; service delivery programs; current trends in gerontology.
GRTY 605 Social Gerontology
3 credits. Focuses on the sociopsychological and sociological aspects of aging. Various sociopsychological and social theories of aging will be discussed. The course will provide a broad overview of several general topics such as the demography of aging, politics and economics of aging, and cross-cultural aspects of aging. The course will also offer an in-depth analysis of particular role changes that accompany aging (i.e., retirement, widowhood, institutionalization).

GRTY 606 Aging and Human Values
3 credits. Identification and analysis of value systems of the aged, exploration of religious beliefs; death and dying; moral, ethical and legal rights; human values and dignity.

GRTY 607 Field Study in Gerontology
3 credits. Systematic exploration and study in the field of an actual problem, issue or task geriatric adult; functional and geriatric concentration. Application of specific concepts and approaches to assessment analysis. Arranged in consultation with the student's program adviser.

GRTY 608 Advanced Topics in Problems, Issues, Gerontology
Semester course; 3 lecture hours. 3 credits. Explores key issues and trends resulting from the aging of the society. Focuses on the development of responsive programs and services for older persons, examines issues related incipient and proposed changes to society's response to the health, income, health care financing and long-term and facility settings of aging persons.

GRTY 612 Recreation, Leisure and Aging
3 credits. An analysis of the quality and quantity of leisure in maximizing the quality of life for the older person. Focus will be on concepts of leisure; the interrelationship of leisure service delivery systems and other supportive services; the meaning of leisure to the elderly in the community and within institutional settings; and innovative programming.

GRTY 624/SOCY 624 Community and Community Services for the Elderly
3 credits. A conceptual/theoretical overview of community focusing on the ecological, psychological and social dimensions of community and on communities of the aged.

GRTY 625 Aging and the Minority Community
3 credits. An analysis of the relationship between the aging process and American minority communities. In addition to the sociological factors, the course will examine demographic, physiological and psychological aspects of minority aging. Attention also will focus on dominant societal problems and federal policies toward the aged.

GRTY 627 Psychology of Health and Health Care for the Elderly
Focuses on factors in the etiology, course and treatment of illness; patient/practitioner relationship; patient compliance and psychosocial issues in terminal care.

GRTY 638 Long-term Care Administration
3 credits. Focuses on unique knowledge and skills considered essential to effective long-term care administration. Emphasis is on the professional role of the long-term care administrator in providing for the health and social needs of the chronically ill and elderly. Applied skills in addressing the technical, human and financial implications to LTC are addressed through cases and field exercises.

GRTY 641/PSYC 641 Survey of Psychological Assessment and Treatment of the Older Adult
3 credits. A combination didactic and skills training course reviewing major treatment strategies and techniques for utilization with the older adult client with emphasis on group, individual and paraprofessional delivery systems; evaluation of crisis intervention and consultation team approaches; lectures, demonstration and classroom practice of actual treatment techniques.

GRTY 642/PSYC 642 Practicum in Clinical Geropsychology
3 credits. An initial practicum geared as an entry to the team practicum experience; focus on familiarizing the student with mental health service delivery systems for the elderly; rotation through a limited number of facilities such as nursing homes, retirement centers, nutrition sites, emergency hotline services for the elderly, and various agencies involved in deinstitutionalization; possible extended placement in a particular facility.

GRTY 692 Independent Studies
1-3 credits. Directed in-depth independent study of a particular problem or topic in gerontology about which an interest or talent has been demonstrated.

GRTY 792 Independent Studies for Master’s/Ph.D.-level Students
Semester course; 3 credits. Independent study in selected area under supervision of gerontology faculty. Focus on in-depth research and analysis of a major focus area of gerontology, leading to a comprehensive, publishable quality review paper. Emphasizes integrating previous graduate training into aging topical area.

GRTY 798-799 Thesis
3-6 credits. A research study of a topic or problem approved by the thesis committee and completed in accordance with the acceptable standards for thesis writing.

Health Administration

HADM 602/PMCH 602 Health System Organization, Financing and Performance
Semester course; 3 lecture hours. 3 credits. Examines the structure, functioning and financing of the U.S. health care system. Emphasizes foundational concepts for understanding and analyzing patterns of health and illness; health care cost, quality, access and utilization; workforce; competition in health care markets; and supplier, provider and payer effectiveness and efficiency.

HADM 606 Health Care Managerial Accounting
Semester course; 3 lecture hours. 3 credits. Prerequisite: Financial Accounting. A foundation course covering health care financial accounting, financial statement analysis, budgeting, reimbursement, costing and short-term decision making. Emphasizes accounting concepts and using financial data in management of providers and payers.

HADM 607 Financial Management in Health Organizations
Semester course; 3 lecture hours. 3 credits. Prerequisite: HADM 606. Examines theory and techniques of corporate financial management as applied to health services providers and insurers including time value of money, working capital management, capital budgeting techniques, cash flow analysis and capital structure planning.

HADM 608 Seminar in Health Care Finance
Semester course; 3 lecture hours. 3 credits. Prerequisites: HADM 606 and HADM 607. Advanced studies of financial issues and the application of analytic tools in case studies and exercises. Designed to enhance and strengthen the knowledge and skills provided in graduate courses and required courses in accounting and finance.

HADM 609 Health Systems Evaluation and Epidemiology
Semester course; 3 lecture hours. 3 credits. Prerequisite: Upper-division course in statistics or business statistics. Introduces principles and methods employed in evaluation research and program evaluation as these relate to health services. Topics covered include health status measurement, evaluation design and managerial applications of epidemiology.

HADM 610 Health Care Management Decision Support Systems
Semester course; 3 lecture hours. 3 credits. Prerequisite: HADM 609. Applications of traditional industrial engineering techniques in health care institutions. Applications of operations research techniques to health care planning, control and decision making including deterministic and stochastic decision analysis models and their use in health service administration.

HADM 611 Hospital and Medical Law
Semester course; 4 lecture hours. 4 credits. Examines basic principles and practices of law affecting hospitals and medical practice: the legal aspects of patient care and treatment,
medical services, and other hospital-patient related functions and employment law.

**HADM 612 Health Information Systems and Performance**
Semester course; 3 lecture hours. 3 credits. Prerequisites: HADM 609 and HADM 610. Analysis of current information and management systems including workforce planning and productivity, financial planning and monitoring, quality assurance, staffing and scheduling, administrative information systems, and patient care systems. Evaluation of alternative uses of computer technology in health care.

**HADM 614 Health Care Marketing**
Semester course; 3 lecture hours. 3 credits. Prerequisites: two semesters of graduate work and permission of the instructor. Examines the relationships between purchasers and providers of health care services and the development of new systems of financing and delivery that seek to improve performance and accountability.

**HADM 630 Administration of Long-term Care (LTC) Facilities and Programs**
Semester course; 3 lecture hours. 3 credits. Focuses on unique knowledge and skills considered essential to effective long-term care administration. Emphasis is on the professional role of the long-term care administrator in providing for the health and social needs of the chronically ill and elderly. Applied skills in addressing the technical, human and conceptual problems unique to LTC are addressed through cases and field exercises.

**HADM 645 Structure and Functions of Health Organizations**
Semester course; 3 lecture hours. 3 credits. Surveys concepts from organizational and management theories applicable to health organizations. Considers issues in organizational structure, strategy and processes for health care organizations.

**HADM 646 Organization Behavior and Design in Health Care Management**
Semester course; 3 lecture hours. 3 credits. Surveys the key concepts of organization behavior and design as they apply to health care management. Focuses on both micro and macro issues including designing and coordinating structures and jobs, managing teams and workgroups, assessing organizational effectiveness, managing organizational politics and conflicts, understanding organizational culture, fostering innovation and creativity, addressing the organizational psychology of the health care workforce and emphasizing the role of leadership.

**HADM 647 Operations Management in Health Care Organizations**
Semester course; 3 lecture hours. 3 credits. Prerequisite: HADM 646. Analysis of the current state of management study and practice with the objective of achieving a balanced development of knowledge and skills in solving the operations problems of health institutions. The managerial process is critically examined with emphasis on leadership behavior and development, structure and purpose of health care organization subunits, interfunctional coordination and organizational processes.

**HADM 648 Strategic Management in Health Care Organizations**
Semester course; 3 lecture hours. 3 credits. Prerequisites: HADM 614 and HADM 647. Integrative seminar on strategic decision making in health care organizations. Considers the concepts and alternative models of strategic management, the strategic management process and the evaluation of strategic decisions.

**HADM 661 Physician Practice Management**
Semester course; 3 lecture hours. 3 credits. Prerequisite: Completion of first year of M.H.A. Program or permission of instructor. Provides a practical overview of management skills and tools necessary to assist a physician group with an efficient service delivery organization. Discusses issues in the larger health care business environment that affect physician professional practice and the operational factors that define a successful organization now and in the future.

**HADM 682 Executive Skills I**
Semester course; 1 lecture hour. 1 credit. Prerequisite: HADM 646. Applied course in executive skills and behavior of the health care executive. Focus is on the health care executive leadership development and personal effectiveness.

**HADM 683 Executive Skills II**
Semester course; 1 lecture hour. 1 credit. Prerequisite: HADM 682. Advanced applied course in executive skill development. Focus is on the health care executive leader and development of skills relating to the external environment of health care organizations. Emphasizes relationships with physicians, governing boards, regulatory bodies, donors and other key stakeholders.

**HADM 690 Departmental Research Seminar**
Semester course; variable hours. Variable credit. Research seminar that focuses on research design and methods organized under a single topic or a series of related topics in health services research. Applied research training for master’s-level students.

**HADM 691 Special Topics in Health Services Organization and Research**
3 lecture hours. 3 credits. Prerequisite: permission of instructor. Course is devoted to specialized content area for health administration. Examples include physician practice management and advanced managed care.

**HADM 692 Independent Study in Health Administration**
1-3 credits. Prerequisite: Permission of instructor. Special study conducted under the guidance of a faculty sponsor.

**HADM 693, 694, 695 Practicum in Health Services Administration**
I: 2 credits; II: 3-5 credits; III: 3 credits. Prerequisite: Admission to the administrative residency. Examination of contemporary problems and issues in the organization, administration and evaluation of health services. A principal focus is the application of alternative approaches to administrative problem solving. Special emphasis is placed on understanding and analysis of the internal and external factors that influence decision making in health care organizations. Graded as "S," "U" or "F."

**HADM 697 Directed Research**
Semester course; variable hours. Variable credit. Special course offered under the guidance of a faculty sponsor for one or more students to design and implement an applied research project in the field setting. Focuses on the application of research methods to policy or operational problems of health care institutions.

**HADM 701 Health Organization Design and Assessment**
Semester course; 3 lecture hours. 3 credits. Prerequisites: HADM 704 and HADM 705, or permission of instructor. Analysis of medical care organizations at both micro and macro levels. Critical review of empirical research in organizational analysis and design. Identifies measurement issues related to quality of care and to formulation of evaluative research on health service programs.

**HADM 702 Health Care Financing and Delivery Systems**
Semester course; 3 lecture hours. 3 credits. Prerequisites: HADM 701, HADM 704 and HADM 705. Critical review and evaluation of major innovations in organization, delivery and financing of health care services. Selected topics may include risk assessment analysis of alternative health care delivery systems and
consideration of alternative public financing of health care.

HADM 704 Foundations of Health Service Organization Theory
Semester course; 3 lecture hours. 3 credits. Examines the roots of foundational theories and concepts in organization theory and their application to research on health care organizations and systems. Emphasizes the environment and structure of health care organizations and systems.

HADM 705 Advanced Health Service Organization Theory
Semester course; 3 lecture hours. 3 credits. Prerequisite: HADM 704 or permission of instructor. Examines, in depth, selected organization theories, emphasizing their application in current health services research. Also investigates the process of theory growth on health-services organization systems.

HADM 760 Quantitative Analysis of Health Care Data
Semester course; 3 lecture hours. 3 credits. Prerequisites: MBRL 624 and HADM 609, or permission of instructor. Research course emphasizing concepts, application and statistical analyses of health care data generated from secondary sources, including data envelopment analysis.

HADM 761 Health Services Research Methods I
Semester course; 3 lecture hours. 3 credits. Prerequisite: Upper-division course in statistics. Research as a systematic method for examining questions derived from related theory and/or health service practice. Major focus is on the logic of causal inference, including the formulation of testable hypotheses relating to health services organization and management; the design of methods and measures to facilitate study, and the concepts, principles and methods of epidemiology.

HADM 762 Health Services Research Methods II
Semester course; 3 lecture hours. 3 credits. Prerequisites: HADM 761 and MBRL 632 or equivalent. Application of multivariate statistical analysis and evaluation research methods to health services research. Emphasis is placed on the use of advanced statistical methods (e.g., LISREL, Event History Analysis) and designs to analyze panel data in the health field.

HADM 763 Health Program Evaluation
Semester course; 3 lecture hours. 3 credits. Prerequisites: HADM 760, 761, or permission of instructor. Analysis of current evaluation research on personal health services and programs in a variety of social and health contexts. Emphasis is placed on the measurement of health care outcomes and the design of experimental and quasi-experimental studies in the health field.

HADM 792 Independent Study in Health Services Organization and Research
Semester course; 1-3 credits. Special study or research leading to a publication. Conducted under the guidance of a faculty sponsor.

HADM 793 Research Practicum
Semester course; 1-3 credits. Available only to second year students. Supervised investigation of selected problems in health services research. Includes conducting and analyzing field research.

HADM 898, 899 Doctoral Dissertation in Health Services Organization and Research
Semester courses; 1-9 credits. A minimum of 9 semester hours is required for Ph.D. degree. Prerequisite: Completion of required course work and comprehensive examination. Dissertation research under direction of faculty adviser.

Health Administration/Executive

HADE 602 Health Systems Organization, Financing and Performance
Semester course; 3 credits. Examines the structure, functioning and financing of the U.S. health services system. Emphasizes foundational concepts for understanding and analyzing health and illness; health care cost, quality, access and utilization; workforce; competition in health care markets; and provider, provider and payer effectiveness and efficiency.

HADE 606 Health Care Managerial Accounting
Semester course; 3 credits. Prerequisite: Permission of the instructor. A foundation course covering health care financial accounting, financial statement analysis, budgeting, reimbursement, costing and short-term decision making. Emphasizes accounting concepts and using financial data in management of providers and payers.

HADE 607 Financial Management in Health Organizations
Semester course; 3 credits. Prerequisite: HADE 606. Examines theory and techniques of managerial corporate management as applied to health service providers and insurers including time value of money, working capital management, capital budgeting techniques, cash flow analysis and capital structure planning.

HADE 610 Health Care Management Decision Support Systems
Semester course; 3 credits. Prerequisite: HADE 606. Examines decision support systems in health care organizations. Focuses on the formulation, implementation, and evaluation of strategy in health care organization systems.

HADE 611 Health Care Law and Bioethics
3 credits. Presents elements of law and legal principles as they apply to the administration of hospitals and health care systems. Emphasizes medical ethics, medical law, medical-legal issues, informed consent, antitrust, health care business law and bioethics. Provides a legal foundation for the practice of health administration and clinical ethics through the use of case law and case analysis.

HADE 612 Health Information Systems and Performance
Semester course; 3 credits. Prerequisite: HADE 610 and permission of the instructor. Correlates health information systems and patient care systems. Evaluates alternative uses of computer technology in health care.

HADE 613 Employment and Labor Law for Health Care Organizations
1 credit. Presents elements of law and legal principles as they apply to the organization and delivery of health care as embodied in employment and labor arrangements. Emphasizes discrimination law, sexual harassment, wage and hour laws, and disability law. Course will be taught using applied problems and case methodology.

HADE 614 Health Care Marketing
3 credits. Fundamental theories, concepts and techniques of marketing applied to the distinctive properties of health care services. Emphasizes the role of marketing and aligning organizational capacity and health care needs; market analysis and planning; strategic marketing management; tactical marketing mix design; competitive analysis; and evaluation of current and alternative marketing programs.

HADE 615 Managerial Epidemiology
Semester course; 2 credits. Focuses on analytical techniques to study and measure the health or population status, and to evaluate health programs. Topics covered include health status measurement, evaluation design and managerial applications of epidemiology.

HADE 624 Health Economics
3 credits. Foundational concepts of microeconomic theory and their application in analyzing health care policy; understanding the structure and dynamics of health care markets; and monitoring and controlling the allocation of resources within health organizations.

HADE 631 Managed Care
Semester course; 3 credits. Prerequisites: two semesters of graduate work and permission of the instructor. Examines the relationships between purchasers and providers of health care services and the development of new systems of financing and delivery that seek to improve performance and accountability.

HADE 645 Health Care Organization and Management Theory
3 credits. A survey of contemporary organization and management theory focusing on concepts and techniques particularly relevant to health service financing and delivery organizations. Emphasizes the health care organization’s environment, goals, strategy, structure and management processes.

HADE 646 Organization Behavior and Design in Health Care Management
Semester course; 3 credits. Surveys the key concepts of organization behavior and design as they apply to health care management. Focuses on both micro and macro issues, including: designing and coordinating structures and jobs, managing teams and work groups, assessing organizational effectiveness, managing organizational politics and conflicts, understanding organizational culture, fostering innovation and creativity, and addressing the organizational psychology of the health care workforce.

HADE 648 Strategic Management in Health Care Organizations
3 credits. Focuses on the formulation, implementation, and evaluation of strategy in health care organizations. Emphasizes concepts dealing with industry structure; the strategic management process; achieving and sustaining competitive advantage.
HADE 681 Special Topics in Health Administration
Variable hours. 1-3 credits. Investigate a specialized content area in a semester-long, seminar format. Topics may change from semester to semester.

HADE 690 Leadership and Health Care Organizations
Semester course; 3 credits. Analyzes the current management/leadership role of the health care executive. Focuses on the requisite knowledge, skills and values essential to success. Involves students in assessing their own leadership styles and skills and discussing key concepts of leadership in various health care organizations and structures.

HADE 691 Health Care Organization Diagnosis and Planning
Variable hours. 1 credit. Provides an opportunity for students to integrate and apply knowledge gleaned from prior course work and to share individual experiences in assessment of and correction of organizational problems that are either operational or strategic.

HADE 692 Independent Study in Health Administration
Variable hours. Variable credit. Offered in all semesters for students to investigate and study topics of major interest.

Nurse Anesthesia

NRSA 601 Principles and Practice of Nurse Anesthesia I
Semester course; 1 laboratory hour. 1 credit. First in a series of six principles and practice courses. Introduces the nurse anesthesia graduate student to concepts necessary to plan and execute safe individualized anesthetics. Covers pre- and postanesthetic assessment, formulation of the anesthesia care plan, preoperative, anesthesia techniques, prevention of complications, monitoring and utilization of anesthesia equipment. Graded as pass/fail.

NRSA 602 Principles and Practice of Nurse Anesthesia II
Semester course; 2 lecture hours. 2 credits. Second in a series of six principles and practice courses. Presents fundamental concepts and techniques essential to clinical anesthesia practice focusing on the theoretical and practical considerations involved in the administration and management of major nerve conduction anesthesia and acute pain management.

NRSA 603 Principles and Practice of Nurse Anesthesia III
Semester course; 3 lecture hours. 3 credits. Third in a series of six principles and practice courses. Delineates techniques of anesthesia management that are considered situation specific for specialized procedures, diagnostic or individualized procedures including advanced airway management and anesthesia care individualized for the patient with cardiovascular and respiratory conditions.

NRSA 604 Principles and Practice of Nurse Anesthesia IV
Semester course; 2 semester hours. 2 credits. Fourth in a series of six principles and practice courses. Intensively covers the advanced concepts and principles of anesthetic management with an emphasis on pediatric, obstetric, endocrine and hemalogical disorders.

NRSA 605 Principles and Practice of Nurse Anesthesia V
Semester course; 2 lecture hours. 2 credits. Fifth in a series of six principles and practice courses. Intensively covers the advanced concepts and principles of anesthetic management with an emphasis on neuroanesthesia and anesthesia delivery in specific patient types.

NRSA 606 Principles and Practice of Nurse Anesthesia VI
Semester course; 2 lecture hours. 2 credits. Last in a series of six principles and practice courses. Intensively covers the advanced concepts and principles of anesthetic management with an emphasis on crisis management.

NRSA 622-623 Clinical Practicum I-II
Continuous courses; 112 clock hours. 1 credit. Introduces clinical care with supervised participation in actual administration of anesthesia. Demonstrates internalization of theoretical concepts and techniques and application in anesthetic management toward the achievement of the terminal objectives for competency in entry-level anesthesia practice.

NRSA 624-627 Clinical Practicum III-VI
675 clock hours. 6 credits. Provides intensive experience in all clinical anesthesia areas. All course work represents an integral phase of sequenced clinical progress toward the achievement of competency in entry-level anesthesia practice. Includes clinical rotations to various affiliate sites to gain experience in management of specialized anesthetic considerations. Emphasis on greater responsibility for a total anesthetic regime along the educational experiential continuum.

NRSA 633 Pathophysiology for Nurse Anesthetists
Semester course; 3 lecture hours. 3 credits. Covers the various physiological conditions and diseases of specific concern to the anesthesia provider with an emphasis on cardiovascular, respiratory, excretory, endocrine, infectious diseases, nutritional, neuromuscular and neurological disorders.

NRSA 642 Professional Aspects of Anesthesia Practice I
Semester course; 1 lecture hour. 1 credit. Provides the graduate nurse anesthesia student an opportunity to focus on a variety of professional issues including but not restricted to the history of nurse anesthesia, roles of the nurse anesthetist and the American Association of Nurse Anesthetists, professional involvement, governmental and nongovernmental regulations of nurse anesthesia practice and standards of care.

NRSA 645 Professional Aspects of Anesthesia Practice II
Semester course; 1 lecture hour. 1 credit. Provides the graduate nurse anesthesia student an opportunity to focus on a variety of professional issues including but not restricted to health care delivery systems, assessing and selecting practice settings and employment options, medical ethics and chemical dependency.

NRSA 647 Professional Aspects of Anesthesia Practice III
Semester course; 1 lecture hour. 1 credit. Provides the graduate nurse anesthesia student an opportunity to focus on a variety of professional issues including but not restricted to reimbursement, influencing health care policy, competence, quality assessment, risk management, departmental management, nurse anesthesia and the legal system, documentation of anesthesia care and current issues and their potential effects on the profession of nurse anesthesia.

NRSA 676 Teaching Methodologies for the Nurse Anesthetist
Semester course; 2 lecture hours. 2 credits. Covers principles of teacher/learner communication, presentation strategies and methods of evaluation pertinent to nurse anesthesia education and includes instructional tools, their application and instructional design.

NRSA 683 Research Methods in Nurse Anesthesia Practice
Semester course; 3 lecture hours. 3 credits. Required of all nurse anesthesia students. Understands and applies the steps involved in the research process. Emphasizes concepts, procedures and processes appropriate for use in research. Develops a research proposal by exploring a topic in the area of anesthesiology. Applies inferential and advanced statistical tests to hypothetical data. Critically analyzes and evaluates anesthesia research studies.

NRSA 699 Directed Research in Nurse Anesthesia
1 credit. May be repeated up to four semesters. Prerequisite: Students are required to take NRSA 699 or NRSA 799.

Nurse Anesthesia Laboratory

NRSZ 601L Laboratory in Principles and Practice of Nurse Anesthesia I
Semester course; 3 laboratory hours. 1 credit. Provides the nurse anesthesia graduate student guided practical experience associated with those concepts presented in NRSA 601. Includes practice in and evaluation of task specific skills in both simulated and actual operating room environments.

Occupational Therapy

OCCT 520 Occupational Therapy Applications: Kinesiology
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Addresses basic components of motion, biomechanics, joint structure, specific muscle groups and muscle function. Analyses functional activities necessary to carry out the tasks and roles of productive living using these principles.
OCCT 521 Occupational Therapy Application to Neuroscience
Semester course; 2 lecture hours. 2 credits. Topics parallel those in ANAT 529. Links basic structure and organization of nervous system to function in typical individuals. Examines neuroscience correlates of diseases and disabilities. Relies on current review of neuroscience and matching function and dysfunction with structure and organization. Case examples across the life span used to understand these potential relationships, and link material to occupational therapy theories and frames of reference guiding practice.

OCCT 522 Interdisciplinary Medical Lectures
Semester course; 3 lecture hours. 3 credits. Presents information on medical conditions commonly seen by occupational therapists, providing diagnostic features, associated conditions, prevalence and course for each. Addresses value and limitations of this knowledge to occupational therapy process, and need for therapists to search out information about other conditions. Introduces medical terminology and therapeutic uses, side effects and precautions of medication. Describes occupational therapy interventions and clinical pathways for certain impairments.

OCCT 531 Nature of Occupational Therapy and Therapeutic Communication
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Provides an overview of occupational therapy fundamentals. Introduces oral and written communication skills and group techniques. Addresses standards of practice, ethics, interpersonal communication, observation and analysis of communication patterns and interview methods. Provides experiences in group leadership and assertiveness techniques. Laboratory exercises chart path of personal development and professional socialization.

OCCT 532 Life Span Occupational Development
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Explores principles and theories of normal growth and development and their influence on occupational performance across the life span. Presents all domains of development and life span roles. Focuses on work/productivity, leisure/play and activities for daily living. Explores importance of significant others and environment, maintaining balance between performance areas and fulfilling expected and desired social roles. Stresses influence of temporal and environmental contexts.

OCCT 533 Occupational Therapy Principles, Values and Theories
Semester course; 4 lecture hours. 4 credits. Examines theoretical constructs used in various models of occupational therapy practice along with legislation, advocacy and empowerment using an historical framework. Addresses influence of legislation relevant to clients and the profession, their dynamic impact on policy and programs and advocacy issues. Emphasizes concepts integral to understanding and using human occupation as a basis for practice as well as the dynamic relationship between occupational therapy principles, values and theories.

OCCT 534 Occupational Therapy Evaluation and Intervention Overview
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Provides an introduction to evaluation and the intervention process as it relates to performance components, areas and contexts. Focuses on general evaluation of assessments for various treatment settings and environments. Emphasis on use of assessment data to determine appropriate treatment intervention and discharge planning for individuals and Vertical communication and written documentation will be covered.

OCCT 620 Occupational Therapy Practice Activities I: Activity Analysis and Occupational Design
Semester course; 2 laboratory hours. 1 credit. Explores activities and occupation and related professional terminology, the occupational design process, activity analysis and therapy as a teaching/learning process. Emphasizes occupational genesis, analysis of occupational performance skills and context.

OCCT 621 Occupational Therapy Practice Activities II: Productive Dimensions of Occupations
Semester course; 2 laboratory hours. 1 credit. Focuses on the productive subjective dimension of occupations through personal performance, observation of occupational participation by others and activity analysis. Emphasizes altering, adapting and modifying activities and contexts to increase occupational performance.

OCCT 623 Occupational Therapy Practice Activities III: Pleasurable and Restorative Dimensions of Occupations
Semester course; 2 laboratory hours. 1 credit. Focuses on the pleasurable and restorative subjective dimension of occupations through personal performance, observation of occupational participation by others with disabilities and leisure activities. Includes experiential learning in the community and exposure to adapted leisure activities.

OCCT 630 Adult Evaluation and Intervention I: Foundations
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Examines adult evaluation and treatment fundamentals that support occupational performance interventions. Covers evaluations and treatment content underlying and applicable to adult occupations. Includes specific assessments, practical information on understanding clients with a variety of conditions and therapist skills.

OCCT 631 Adult Evaluation and Intervention II: Activities of Daily Living
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Examines evaluation and treatment of activities of daily living (ADL) for adults in natural and treatment environments. Focuses on occupational performance while considering underlying client factors and context. Students routinely apply knowledge of clinical reasoning, theoretical practice models, and contextual issues when evaluating and planning treatment for a variety of case studies covering a range of ADLs.

OCCT 632 Adult Evaluation and Intervention III: Work, Play/Leisure, Geriatrics
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Examines evaluation and treatment of work/productive pursuits, play/leisure for environments. Emphasizes geriatric treatment issues. Focuses on occupational performance, considering underlying components and contexts. Addresses clinical reasoning, practice models, contextual issues when evaluating and planning treatment.

OCCT 635 Psychosocial Evaluation and Intervention I: Foundations
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Examines fundamental knowledge of adolescent and adult psychosocial evaluation and intervention to support adaptation and participation in occupation. Includes content and specialty practice psychosocial knowledge, information on stigma and stereotyping, therapist skills, specific assessments and interventions, and leadership of a community-based group intervention.

OCCT 636 Psychosocial Evaluation and Intervention II: Experiences with Adolescents and Adults
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Focuses on occupational performance of adolescents and adults with psychosocial dysfunction. Students apply knowledge of clinical reasoning, theoretical practice models, and contextual issues when evaluating and planning psychosocial intervention of case studies in service learning experiences.

OCCT 640 Pediatric Evaluation and Intervention I: Infant and Preschool Children
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Focuses on occupational performance of infants, toddlers and preschoolers with disabilities. Explores a variety of frames of reference and evaluative and intervention approaches for children and their families in medical, home, community and educational settings. Uses a holistic approach to develop child’s abilities to play/perform basic ADLs while meeting expectations of family and environment.

OCCT 641 Pediatric Evaluation and Intervention II: Ages 6 to Adolescence
Semester course; 2 lecture and 4 laboratory hours. 4 credits. Focuses on occupational performance of children with disabilities ages six through adolescence. Explores a variety of frames of reference, evaluative and intervention approaches for children, their families in multiple practice arenas emphasizing the child’s performance in educational settings. Uses a holistic approach to develop child’s competence in school, activities of daily living, play, work and community while meeting expectations of family and environment. Includes field-based experiences.

OCCT 650 Occupational Therapy in Health Care
Semester course; 3 lecture hours. 3 credits. Introduces contemporary issues, trends in occupational therapy health-care settings. Covers principles of managed care and impact on occupational therapy practice. Focuses on changes in practice sites, service delivery models and patient demographics. Emphasizes how occupational therapists can influence health policy, advocate for change and address emerging professional ethical issues. Encourages consideration of integrating holistic/biopsychosocial nature of occupational therapy into biomedical health-care systems.

OCCT 651 Administration and Supervision of Occupational Therapy Services
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Covers management of human and non-human resources to provide
efficient and effective occupational therapy services; nature of formal and informal organizations, administrative process and administration; includes supervision, consultation and the planning of occupational therapy fieldwork education.

OCCT 654 Children and Young Adult Advanced Assistive Technology Applications in Occupational Therapy
Semester course; 3 credits. Provides an in-depth view of assistive technology and human-environment/technology interface for children and young adults. Focuses on the use of AT in occupational therapy evaluation and intervention. Designed to integrate and develop strategies for integrating computer hardware and software, augmentative communication devices, ECUs, powered mobility, toys and low technology solutions into home, school, recreation, community and work environments. Requires student problem-solving related to pediatrics or young adult research and clinical practice.

OCCT 655 Older Adult Advanced Assistive Technology Application in Occupational Therapy
Semester course; 3 credits. Provides an in-depth view of assistive technology and human-environment/technology interface for older adults with disabilities. Focuses on use of assistive technology in occupational therapy evaluation and intervention. Exposes occupational therapy students to tools and strategies for integrating environmental control units, powered mobility, computer hardware and software, augmentative communication devices, visual, hearing impaired and low technology solutions into the lives of elderly assistive technology consumers. Requires students to problem solve within their area of gerontology research and clinical practice.

OCCT 656 Advanced Neuroscience Applications in Occupational Therapy
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Requires instructor’s permission for non-occupational therapy majors. Links basic structure and organization of nervous system to function in typical individuals. Students examine current neuroscience of diseases and disabilities encountered in clinical practice, matching function and dysfunction with structure and organization. Presents specific-case applications. Exposes student to tools and link cases to contemporary OT theories and frames of reference guiding practice.

OCCT 660 Level I Fieldwork in Occupational Therapy
Semester course; 45 clinical/seminar hours. 1 credit. Enriches curriculum. Includes supervision of the treatment/intervention process. A preliminary step to the more complex Level II Fieldwork clinical experience.

OCCT 661 Occupational Therapy in the Schools
Semester course; 3 lecture hours. 3 credits. Registration open to other professional students with permission of the instructor. Studies the roles and functions of occupational therapists in school settings as defined by the educational model, government regulations and service provision patterns. Emphasizes person-centered planning, parent and professional collaboration and educationally relevant approaches. Integrates the use of research and clinical reasoning to provide occupation-based practice for students with disabilities of all ages.

OCCT 662 Neuroscience Review and Sensory Integration
Semester course; 3 lecture hours. 3 credits. Reviews neuroscience basics related to function and dysfunction. Overviews brain structures and function on both gross and cellular levels. Examination of the sensory integration neuroscience theory base which provides foundation for additional study of brain structure as it relates to function and dysfunction. Links understanding of neuroscience with occupational therapy practice.

OCCT 663 Beyond the Basics: Advanced Evaluation and Intervention in Pediatric Occupational Therapy
Semester course; 3 credits. Restricted to post-professional master’s level students. Provides in-depth view of selected occupational therapy assessment and intervention techniques for children and youth with disabilities. Exposes students to practical tools and strategies for integrating treatment into home, school, recreation, community and work environments. Requires students to investigate their own clinical reasoning skills relative to their area of pediatric interest, clinical practice and research. Specifically focuses on using sensory integration theory and practice for infants and children, issues related to feeding and play, and the transition of adolescents with disabilities into postsecondary, work and community environments.

OCCT 670 Case-based Clinical Reasoning in Occupational Therapy
Semester course; 4 laboratory hours. 2 credits. Utilizes case studies to develop clinical reasoning skills and examine evaluation and treatment alternatives for persons with occupational performance limitations. Focuses on life-span development issues. Uses cases designed to integrate existing strategies based on previously presented material. Incorporates assistive technology as an intervention tool into the case-based learning process.

OCCT 671 Advanced Theory in Occupational Therapy
Semester course; 3 lecture hours. 3 credits. Restricted to post-professional master’s level students. Integrates current theoretical constructs incorporated in various conceptual models of practice with the clinical expertise of experienced occupational therapists throughout comprehensive examination of theory. Emphasizes the clinical reasoning process and fosters high level theoretical and clinical thinking. Emphasizes the dynamic relationship between occupational therapy theory and practice and complements concepts integral to understanding client-based and occupation-based practice.

OCCT 672 Dimensions of Occupation
Semester course; 3 lecture hours. 3 credits. Examines a variety of topics and concepts related to study of occupation. Relies on biological, sociological, anthropological, psychological and occupational therapy literature to ensure the investigation of various dimensions of the human as an occupational being. Case examples will be analyzed to link this material to occupational therapy theory and practice.

OCCT 673 Health-care Delivery and Occupational Therapy Practice Models
Semester course; 3 lecture hours. 3 credits. Restricted to post-professional master’s level students. Introduces contemporary issues and trends in occupational therapy health care settings and explores implications of managed care and impact on occupational therapy practice. Focuses on changes in practice sites, service delivery models and patient demographics. Emphasizes on how occupational therapy influences health policy, advocates change and addresses emerging professional and ethical issues. Encourages consideration of integrating holistic/biopsychosocial nature of occupational therapy into biomedically oriented health-care system.

OCCT 680 Level II Fieldwork in Occupational Therapy: A
Semester course; students must complete 40 hours per week for 12 weeks. Variable credit. Maximum of 9 credits. May be taken over two semesters. Provides an in-depth experience in delivering occupational therapy services to a variety of individuals across life span, in a variety of settings. Promotes interpretation of previously learned skills and knowledge through clinical reasoning and effective practice. Develops professionalism and competence as entry-level occupational therapists. Graded as pass/fail.

OCCT 681 Level II Fieldwork in Occupational Therapy: B
Semester course; students must complete 40 hours per week for 12 weeks. Variable credit. Maximum of 9 credits. May be taken over two semesters. Clinical experience must be different from that offered in OCCT 680. Expands experience in delivering occupational therapy services to variety of individuals across life span, in variety of settings. Promotes interpretation of previously learned skills and knowledge through clinical reasoning and effective practice. Provides in-depth experience in delivering occupational therapy services to variety of individuals across life span, in variety of settings. Promotes interpretation of previously learned skills and knowledge through clinical reasoning and effective practice. Develops professionalism and competence as entry-level occupational therapists. Graded as pass/fail.

OCCT 690 Occupational Therapy Seminar
Variable hours. 1-3 credits. May be repeated for a maximum of 4 credits. Investigation, presentation and discussion of current problems and issues in the field of occupational therapy.

OCCT 691 Special Topics in Occupational Therapy
Semester course; 1-3 credits. Designed around the interests of students, faculty expertise, and availability and expertise of Richmond-area occupational therapists or visiting lecturers. Format may include intensive mini-courses or workshops, an advanced course with some opportunity for election and development of knowledge and skills in a specialized area of occupational therapy.

OCCT 693 Fieldwork: Psychosocial Dysfunction
Restrict to 1-9 credits.

OCCT 694 Fieldwork: Physical Dysfunction
Restrict to 1-9 credits.

OCCT 695 Fieldwork: Specialty (Optional)
Twelve weeks full-time experience in programs providing occupational therapy
services. 1-9 credits. Minimum total required for all fieldwork courses is 18 semester hours. Determination of the amount of credit and permission by the instructor and department chair must be secured prior to registration for the course. Supervised fieldwork experiences are arranged in various settings for the application of academically required knowledge. Placements include experiences in prevention, health maintenance, remediation, daily life tasks and vocational adjustment. Fieldwork settings may include hospitals, rehabilitation centers, school systems, community agencies, camping programs, penal systems and the like. Fieldwork experiences are arranged individually, but placement in a specified location cannot be guaranteed. In the event of failure, the course may be repeated only upon recommendation by the academic program faculty. Fieldwork must be completed no later than 24 months following completion of the academic phase.

**OCCT 697 Independent Study**

1-3 credits. The student will submit a proposal for investigating some area or problem in occupational therapy not ordinarily included in the regular curriculum. The student’s proposed study must be described in a contract written by the student and approved by the faculty member. The results of the study will be presented in a written or oral report.

**OCCT 698 Research in Occupational Therapy**

Semester course; 1-3 credits. Completion of a proposal for a research project relevant to occupational therapy.

**OCCT 709 Research Process and Statistical Analysis in Occupational Therapy**

Semester course; 4 lecture hours. 4 credits. Restricted to entry-level master’s students. Prepares students to write research proposal for completion of the requirements of the master’s degree. Covers basic steps in research process, including problem definition, literature review, design, data collection and analysis, and dissemination of findings. Students will demonstrate understanding of statistical analysis after completing a review of introductory statistical concepts. Addresses quantitative and qualitative approaches. Students will review and critically analyze literature in preparation for subsequent research experiences.

**OCCT 710 Research Process in Occupational Therapy**

Semester course; 3 lecture hours. 3 credits. Prepares students to write research proposal for completion of the requirements for the master’s degree. Covers basic steps in research process, including problem definition, literature review, design, data collection and data dissemination. Addresses quantitative and qualitative approaches. Students complete a comprehensive literature review relevant to be applied toward the master’s thesis research.

**OCCT 711 Research Process in Occupational Therapy: Qualitative Methods**

Semester course; 3 lecture hours. 3 credits. Introduces qualitative methods of research with goals of understanding the theoretical underpinnings, gaining practical experience and developing an understanding of the “self” as an instrument of research. Focus on qualitative methods in occupational therapy research and their application to practice.

**OCCT 729 Research Practicum**

Semester course; 3 seminar hours. 3 credits. Supervised investigation of selected problems in occupational therapy. Requires students to participate in research implementation. Addresses overall research design and implementation process and skills needed for publication and presentation of research. Students complete an individualized learning contract. Graded as “S,” “U” or “F”.

**OCCT 793 Clinical Specialty Practicum**

Three to nine hours of concentrated clinical experience in the student’s chosen area of specialization under the supervision of an experienced clinician (minimum three hours per week for each credit), and one credit hour for guided library research related to topic of practice with preparation of a paper examining the theoretical and empirical base of practice in specialty area. A contract is prepared by the student and approved by a faculty adviser and clinical supervisor.

**OCCT 798 Thesis**

3-6 credits. Completion of a proposal for a master’s degree thesis relevant to occupational therapy.

**OCCT 799 Thesis**

1-6 credits. Completion of a master’s degree thesis relevant to occupational therapy.

### Patient Counseling

**PATC 501 Introduction to Health Care Ministry**

Semester course; 1 lecture and 1 practicum hours. 1 credit. Introduces the student to the health-care environment through observation, reading and reflection. Taught jointly with seminary faculty. Required course for dual degree program.

**PATC 510 Introduction to Patient Counseling**

Semester course; 3 lecture and optional clocked clinical hours. 3-5 credits. Introduces the student to the development and practice of spiritual care of patients and families. Includes case study and interaction. Assignment to the hospital is available to those seeking clinical pastoral education credit. Designed for the nonspecialist.

**PATC 511 The Professional Caregiver**

Semester course; 2 lecture hours. 2 credits. Focuses upon development of professional identity and growth within the helping professions. Emphasizes the context of the health-care environment and its impact upon caregivers, patients and families. Includes practical application of theory. Incorporates the use of clinical material. Designed for the nonspecialist.

**PATC 515 Basic Patient Counseling**

7 lecture and 300 clocked clinical hours. 9 credits. Provides an extensive course of study toward the development of pastoral skills in the hospital context. Assigns students to select clinical areas with faculty supervision. Utilizes group process and individual supervision for the review of clinical material.

**PATC 551 Selected Issues in Health Care**

Semester course; 1 lecture hour. 1 credit. May be repeated to a maximum of 2 credits. Exposes the student to a number of current trends and topics relevant to the contemporary U.S. health care delivery system. Content changes from semester to semester. Utilizes the expertise of hospital personnel.

**PATC 555 Theory and Practice of Patient Counseling I**

Semester course; 3 lecture and 300 clocked clinical hours. 5 credits. Prerequisites: PATC 515 or equivalent. Emphasizes the theological foundations of pastoral care and counseling. Provides an in-depth examination of clinical material in a seminar setting.

**PATC 556 Theory and Practice of Patient Counseling II**

Semester course; 3 lecture and 300 clocked clinical hours. 5 credits. Prerequisites: PATC 515 or equivalent. Explores, in a small group setting, the dynamics common to group behavior. Reflects upon the use of group process learning. Utilizes an experiential method of learning.

**PATC 562 Group Process II**

Semester course; 2 lecture hours. 2 credits. Prerequisites: PATC 515 or equivalent. Focuses upon the various theories of group process. Focuses upon application of theory to a variety of clinical and administrative settings. Utilizes an experiential method of learning.

**PATC 592 Independent Study in Patient Counseling**

Semester course; 1-4 credits. May be repeated for a maximum of 4 credits. Provides opportunity to increase clinical and interpersonal skills in specialty areas through patient care, parallel reading and individual faculty supervision.

**PATC 601 Theory of Group Leadership**

Semester course; 2 lecture hours. 2 credits. Prerequisite: PATC 561 or 562. Explores various theories of group leadership. Provides opportunity to test skill development within a peer context.

**PATC 609 Supervised Clinical Practice I**

Semester course; 3 lecture and 300 clocked clinical hours. 5 credits. Prerequisites: PATC 555 and PATC 556. Provides the opportunity to apply and practice pastoral care skills with patients and their families under faculty supervision. Emphasizes professional competence toward an integration of theological, psychological and sociological aspects of spiritual care in varied clinical contexts.

**PATC 610 Supervised Clinical Practice**

Semester course; 3 lecture and 300 clocked clinical hours. 5 credits. May be repeated for a total of 10 credits. Prerequisites: PATC 555 and PATC 556. Provides the opportunity to apply and practice clinical skills in a pastoral care specialty under faculty supervision. Utilizes university and hospital personnel in specialty areas.

**PATC 619 Spiritual and Social Integration Seminar**

Semester course; 1 lecture hour. 1 credit. This course is a summary course required for persons in the dual-degree program. Provides in-depth reflection on the theological and social implications of ministry within the health-care environment. Course is taught jointly with seminary faculty.
PATC 620 Religious and Social Factors in Patient Counseling
Semester course; 2 lecture hours. 2 credits. Provides an understanding of the theological and social factors related to hospitalization. Focuses on the use of ritual and tradition in caring for persons in crisis.

PATC 621 Care of the Dying
Semester course; 2 lecture hours. 2 credits. Explores the spiritual and psychological dynamics associated with loss for patients and families. Offers special attention to the emotional and spiritual impact on caregivers that work with dying patients. Includes the use of clinical material within a group experience.

PATC 635 Clinical Ethics
Semester course; 2 lecture hours. 2-3 credits. Applies the principles of biomedical and health-care ethics to a more informed understanding of ethical decision-making in the clinical environment. Concerned with the identification, analysis and resolution of ethical problems that arise in planning for the care of patients. Emphasizes the ethical responsibilities of clinical and pastoral caregivers.

PATC 636 Professional Identity and Ethics
Semester course; 2 lecture hours. 2 credits. Focuses on guidelines for professional ethics in the development and maintenance of professional and personal integrity, leadership ability and the enhancement of a congruency between spiritual, psychological and physical maturity.

PATC 639 Pastoral Care Management
Semester course; 2 lecture hours. 2 credits. Surveys the theory and practice of pastoral-care management within the present health-care environment including personnel management, process improvement, benchmarking and qualitative research design. Taught cooperatively with hospital personnel.

PATC 653 Patient Counseling Evaluation I
Semester course; 2 lecture and 6 practicum hours. 4 credits. Surveys the theory and practice of case based education and clinical evaluation relevant for pastoral supervision. Observation of and reflection upon the work of ACPE supervisors are required.

PATC 654 Patient Counseling Evaluation II
Semester course; 2 lecture and 6 practicum hours. 4 credits. Continues the theoretical and practical focus of PATC 653. Students move from observation to participation in clinical evaluation of pastoral care interns.

PATC 661 History of Pastoral Supervision
Semester course; 3 lecture hours. 3 credits. Focuses on the history and development of clinical pastoral education as a movement. Exposes the student to theoretical basis of clinical pastoral education as established in professional and organizational standards.

PATC 663 Theory of Pastoral Supervision I
Semester course; 3 lecture hours. 3 credits. Focuses on the literature in pastoral supervision. Emphasizes the applicability of educational and pastoral theory relevant for clinical pastoral education.

PATC 664 Theory of Pastoral Supervision II
Semester course; 2 lecture hours. 2 credits. Focuses on the literature related to cultural and gender factors relevant for pastoral supervision.

PATC 665 Selected Topics in Pastoral Supervision
Semester course; 1-4 credits. May be repeated for a total of 4 credits. Presents a variety of topics on selected theoretical, educational, and practical issues relevant for pastoral supervision.

PATC 666 History of Pastoral Supervision
Semester course; 2 lecture and 15 practicum hours. 7 credits. Prerequisite: PATC 654. Advanced attention to integration of education and personal identity. Includes the actual practice of supervision under faculty guidance. Restricted to individuals admitted to candidacy status in ACPE. May be repeated.

PATC 667 Clinical Research Practicum
Semester course; 2 lecture and 18 practicum hours. 9 credits. Prerequisite: PATC 666. Provides opportunity for independent supervision of pastoral care interns with mentoring and evaluation by faculty. Utilizes ACPE supervisory personnel. Restricted to individuals admitted to candidacy status in ACPE. May be repeated.

PATC 668 Advanced Clinical Pastoral Supervision
Semester course; 2 lecture hours. 2 credits. Focuses on the use of ritual and tradition in the clinic. Continues the development of collaborative and interdisciplinary project development.

Paterson Theology

PHTY 501 Gross Anatomy (Physical Therapy)
Semester course; 4 lecture and 6 laboratory hours. 7 credits. Examines the structural and functional anatomy of the human musculoskeletal system through lecture and cadaver dissection. Develops understanding of fundamental facts and principles that apply to professional practice through lecture, dissection, radiographic examination and clinical correlation.

PHTY 502 Kinesiology
3 lecture and 1 laboratory hours. 4 credits. Introduces the student to the kinematics and kinetics of human movement. Emphasis is placed on osteokinematics, arthrokinematics and the structures that limit and/or guide movement.

PHTY 503 Applied Exercise Physiology
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Restricted to students in the Professional Doctor of Physical Therapy program. Integrates principles and practices of applied physiology, exercise and health promotion in primary, secondary and tertiary prevention of impairments, functional limitations, and disabilities with changes in physical function and health status. Emphasizes assessment and therapeutic exercise principles and associated underlying physiology.

PHTY 505 Applied Microscopic Anatomy for Physical Therapy
Semester course; 3 lecture hours. 4 credits. Examines the basic components of cells in terms of their structure and function. Cells and tissues of greatest importance to physical therapists are studied in detail, and their response to injury is explored. Reviews methods of studying cells.

PHTY 506 Functional Neuroanatomy
Semester course; 5 lecture hours. 5 credits. Examines the basic structure and function of the nervous system with special emphasis on topics of greatest concern to physical therapists. Uses neurobiological approach to integrate the basic health sciences of neuroanatomy, neurophysiology and clinical neuroscience.

PHTY 508 Measurement and Assessment
Semester course; 3 lecture and 3 laboratory hours. 6 credits. Teaches some of the basic evaluation methods and measurement procedures used by physical therapists in history taking and physical examination. Includes lecture, demonstration and practice in measurement of the length and girth body parts, manual and mechanical muscle testing, joint range of motion, accessory motion testing and palpation.

PHTY 510 Rehabilitation I
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Introduces basic clinical skills and procedures, including measurement of vital signs, patient lifting and moving techniques, progressive mobilization, medical asepsis and principles of bandaging. Introduces record keeping and professional communication.

PHTY 512 Professional Aspects of Physical Therapy
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Restricted to students in the Professional Doctor of Physical Therapy program. Introduces communication methods and skills appropriate for interaction with patients, families and colleagues. Provides introduction to sociocultural, psychological, professional and ethical issues that impact patient management as well as professional communication. Emphasizes professional demeanor and presentation as identified by the generic abilities.

PHTY 516 Topics in Health Care Services and Delivery
Semester course; 2 lecture hours per week for eight weeks. 1 credit. Restricted to students in the Professional Doctor of Physical Therapy program. Provides an overview of the roles in health care related to access, utilization, organization and financing of services, as well as general overview of the interrelationship among health care consumers, providers, organizations, regulators and third party payers. Discusses implications for public policy and legislative action. Uses critical review of literature and case studies to illustrate key concepts and their relevance to the practice of physical therapy.
PHTY 520 Clinical Education I  
Semester course; 160 clock hours. 4 credits.  
Restricted to students in the Professional Doctor of Physical Therapy program.  
Four-week, full-time clinical experience. Introduces physical therapy practice and allows students to develop interpersonal skills with patients, peers and other health professionals. Begins with the integration of the knowledge gained in class to the clinical setting. Helps students develop confidence in the role of a beginning clinician in patient handling, physical therapy evaluation and treatment procedures. Explores various aspects of physical therapy, including its role in comprehensive care delivery. Applies and integrates course material from the first professional year of education.

PHTY 531 Scientific Inquiry  
Semester course; 2 lecture hours. 2 credits.  
Introduces concepts and principles of the scientific method as the basis for investigating questions, hypothesis development, research design and methodology, and statistical reasoning and analysis. Discusses the basis for critical review of professional literature and determination of the relevance and applicability of research findings to specific patients with the goal of promoting evidence-based practice.

PHTY 535 Growth and Motor Development  
Semester course; 2 lecture and 2 laboratory hours. 3 credits.  
Presents age-related differences and changes in physical and motor function across the human life span and current issues and trends in motor development theory and research.

PHTY 537 Rehabilitation II  
Semester course; 2 lecture and 2 laboratory hours. 3 credits.  
Restricted to students in the Professional Doctor of Physical Therapy program. Presents evaluation and treatment methodology for the acute care patient. Focuses on the rehabilitation phase of patient care and emphasizes the spinal cord injured patient. Rehabilitation concepts include wound care, patient mobility, wheelchair mobility, patient transfers and gait training. Clinical visits expose students to patient evaluations and patient care in the acute and rehabilitation settings.

PHTY 601 Advanced Measurement Concepts  
Semester course; 3 lecture hours. 3 credits.  
Investigates the principles of measurement theory as applied to clinical practice. Reviews basic principles guiding electronic instrumentation and electromyography. Examines the theoretical bases for the examination and treatment approaches used in orthopedic physical therapy or neurologic physical therapy.

PHTY 605 Foundations for Pathokinesiology  
Semester course; 3-4 lecture hours. 3-4 credits.  
A study of the principles that form the foundation for pathokinesiology and therapeutic kinesiology. Integration of principles of motor development, control and learning with emphasis on abnormal motor behavior and its remediation.

PHTY 606 Therapeutic Kinesiology  
Semester course; 1-3 lecture and 3 clinical hours. 2-4 credits.  
Study of motor behavior in both normal and pathological conditions. Reading and discussion of the basic literature of current neurologic approaches to therapeutic exercise and an integration of these concepts into a comprehensive model of human movement.

PHTY 608/REMS 608 Advanced Musculoskeletal Sciences  
Semester course; 3 lecture hours. 3 credits.  
Examines the structure and function of tissues of the musculoskeletal system. Investigates mechanisms of healing of these tissues and explores the affects of various modalities, altered use and disease on the structure and function of musculoskeletal tissues.

PHTY 609 Clinical Biomechanics  
Semester course; 3 lecture hours. 3 credits.  
Provides an opportunity to develop knowledge in sufficient depth to understand how selected biomechanical factors influence normal and pathologic human form and movement. Stresses validity and reliability of methods of evaluating musculoskeletal form and function.

PHTY 611 Research Process  
Semester course; 2 lecture hours. 2 credits.  
Readings, discussions and reports on the current status of the physical therapy literature and validation of clinical practice, clinical administration and professional education. A model for professional development, the role of research in the physical therapy program, the basis of research design are presented non-mathematically. Required of all advanced master of science degree students unless excused by the faculty.

PHTY 612/REMS 612 Advanced Biomechanics  
Semester course; 2 lecture and 2 laboratory hours. 3 credits.  
Prerequisite: REMS/HEMS 611 or permission of instructor. Designed for students in the interdisciplinary Ph.D. in Rehabilitation program. Covers advanced biomechanics techniques for the evaluation and quantification of human performance. Encourages scientific thought with practical applications.

PHTY 615 Pharmacology (Physical Therapy)  
Semester course; 1 lecture hour. 1 credit.  
Restricted to students in the Professional Doctor of Physical Therapy program. Reviews pharmacological management of common disease states and pathophysiology. Emphasizes the utilization of subjective and objective patient data for the assessment, monitoring and optimization of pharmacological therapy.

PHTY 621 Therapeutic Agents  
Semester course; 4 lecture and 2 laboratory hours. 5 credits.  
Examines the theoretical bases for and therapeutic application of thermal, mechanical and electrical agents. Emphasizes the physiological and anatomical effects, indications and contraindications for electrical current, diathermy, superficial heat and cold, massage, ultrasound, traction, laser and compression therapy. Analyzes relative current scientific literature and uses laboratories for practice and clinical problem solving.

PHTY 623 Cardiopulmonary Physical Therapy  
Semester course; 2 lecture and 2 laboratory hours. 3 credits.  
Applies principles of pathophysiology of the cardiovascular and respiratory systems; includes physical therapy assessment and treatment of patients with cardiac and respiratory disorders.

PHTY 624 Physical Therapy Seminar I  
Semester course; 2 credits.  
Restricted to students in the Professional Doctor of Physical Therapy program. Provides an advanced review of the concepts and principles of the research process and evidence-based practice. Focuses on skills needed to perform a critical appraisal of professional literature and to determine the relevance and applicability of research findings to a specific patient or series of patients based on information collected during the first summer clinical experience. Provides opportunity to develop oral patient case presentation skills.

PHTY 626 Life Span Development and Motor Control I  
Semester course; 4.5 lecture and 3 laboratory hours. 6 credits.  
Restricted to students in the Professional Doctor of Physical Therapy program. Covers models of neurologic dysfunction, family-centered care, interdisciplinary teamwork and neurophysiological principles of physical therapy. Includes units on motor control and learning, motor development and pediatric assessment from birth to early adulthood.

PHTY 627 Life Span Development and Motor Control II  
Semester course; 2 lecture hours. 2 credits.  
Discusses age related changes in physical structure, motor control and psychosocial/cognitive issues in humans from middle adulthood to the end of life. Covers the geriatric population and the physical therapy management of problems with the integumentary system. Highlights the role of physical therapy in having modifications based on age related changes.

PHTY 629 Special Topics in Physical Therapy  
Semester course; 1 lecture hour. 1 credit.  
Provides an opportunity to pursue and present a topic of interest that is related to physical therapy evaluation and management. Requires a final paper and oral checkouts.

PHTY 640 Neurologic Physical Therapy  
Semester course; 4 lecture and 4 laboratory hours. 6 credits.  
Prerequisites: PHTY 535 and PHTY 539. Applies principles of motor development, control and learning to the evaluation and treatment of neuromotor disorders. Critically surveys current theory and practice of neuromotor therapeutics.

PHTY 644 Orthotics and Prosthetics  
Semester course; 2 lecture hours. 2 credits.  
Prepares the student to participate as a member of the professional prosthetic or orthotic clinic team, integrates material from other courses, and teaches basic skills in orthotic and prosthetic assessment, prescription, and training and performing initial and final prosthetic and orthotic checkouts.

PHTY 646 Clinical Medicine  
Semester course; 2 lecture hours. 2 credits.  
Comprehensive course in clinical medicine and sciences relevant to the practice of physical therapy. Medical practitioners from the MCV Campus and surrounding areas participate. Topics include psychiatry, pharmacology, hematology, oncology, dermatology, dentistry, rheumatology, neurology and burn therapy.

PHTY 648 Orthopaedic Physical Therapy  
Semester course; 4 lecture and 2 laboratory hours. 5 credits.  
Examines principles and techniques used by physical therapists for the treatment of patients with orthopaedic disorders. Uses scientific evidence and
theoretical rationale in a problem-solving approach to develop treatment plans for patients with orthopaedic musculoskeletal disorders.

PHTY 650 Clinical Education II
Semester course; 320 clock hours. 8 credits. Restricted to students in the Professional Doctor of Physical Therapy program. Eight-week, full-time clinical experience designed to develop competency in physical therapy evaluation and treatment. Teaches the use of sound scientific rationale and problem solving skills in aspects of patient care. Promotes the development of an independent professional through synthesis and utilization of advanced academic theory in evaluation and treatment. Encourages the exploration of interest areas in a variety of practice settings.

PHTY 651 Professional Issues in Physical Therapy
Semester course; 2 lecture hours. 2 credits. Restricted to students in the Professional Doctor of Physical Therapy program. Discusses professional issues facing the modern physical therapy practitioner, including ethical decision making, state and national current physical therapy issues, and legislative efforts. Provides opportunity for advanced study. Includes current literature, assertiveness skills, conflict resolution, as well as preparation for employment via resume and portfolio writing and interview skills.

PHTY 654 Physical Therapy Seminar II
Semester course; 18 clock hours. 1 credit. Restricted to students in the Professional Doctor of Physical Therapy program. Provides the opportunity to review, integrate and develop strategies using previously presented material. Research to present an oral case study of a patient or patients from the clinical experience in the previous summer.

PHTY 661 Administration and Management in Physical Therapy
Semester course; 2 lecture hours. 2 credits. Restricted to students in the Professional Doctor of Physical Therapy program. Provides students with a basic understanding of operational issues related to physical therapy practice in a variety of settings. Topics include leadership, operational and business success measures, reimbursement, quality assurance, performance improvement, utilization review, risk management, documentation and marketing. Skill sets include, at an introductory level, supervision, delegation, hiring practices, budget development and analysis, peer review, outcomes measurement, and ethical decision making.

PHTY 670 Clinical Integration of Physical Therapy Concepts
Semester course; 2 credits. Restricted to students in the Professional Doctor of Physical Therapy program. Uses case studies in a problem-based learning approach, which will allow students to integrate knowledge about patient evaluation and assessment with treatment design, implementation, and progression. Integrates material from DPT courses with clinical research. Provides experience in writing individual case reports.

PHTY 674 Physical Therapy Seminar III
Semester course; 1 credit. Restricted to students in the Professional Doctor of Physical Therapy program. Integrates material from DPT courses with clinical research. Provides experience in writing individual case reports.

PHTY 680 Clinical Education III
Semester course; 320 to 640 clock hours. 8-16 credits. May be repeated for a total of 24 credits. Eight- to 12-week, full-time clinical experience designed to develop entry-level competency in physical therapy education and training for postgraduate clinical setting. Includes the use of sound scientific rationale and problem solving skills in all aspects of patient care. Promotes the development of an independent professional through synthesis and utilization of advanced academic theory in evaluation and treatment.

PHTY 690 Physical Therapy Graduate Seminar
Semester course; 1 credit. Provides opportunity to develop knowledge and skills in evaluating published scientific literature related to physical therapy, developing researchable questions and orally presenting the material in a professionally appropriate manner.

PHTY 691 Special Topics in Physical Therapy
1-4 credits. Guided independent study of specific topics not discussed in courses or discussed in less detail in courses. Student’s desired topic of study must be identified and approved prior to enrollment.

PHTY 692 Clinical Specialty Seminar
Semester course; 0.5-3 credits. Individual reports dealing in depth with the history, current status and problems in a given area of clinical specialization.

PHTY 693 Clinical Specialty Practicum
60 clock hours per credit. 1-9 credits. Concentrated clinical experience under the guidance of an approved preceptor.

PHTY 798 Research in Physical Therapy

Rehabilitation Counseling

RHAB 502 American Sign Language I
Semester course; 3 credits. Introduces the rules of grammatical structure of ASL with a focus on grammar and vocabulary to increase the learner’s expressive and receptive understanding of the language. Provides an introduction to Deaf culture and crosscultural interactions, and to tactile and close-vision communication techniques used by individuals who are deaf-blind.

RHAB 503 American Sign Language II
Semester course; 3 credits. Provides continued study of the grammatical structure of ASL; introduction of additional vocabulary with emphasis on expressive and receptive competence; continued study of the tactile and close-vision communication techniques used by individuals who are deaf-blind; and continued study of the Deaf culture.

RHAB 521 Foundations of Substance Abuse Rehabilitation
Semester course; 3 lecture hours. 3 credits. Provides an overview of substance abuse and dependent as well as co-occurrence disorders (including biological, psychological, behavioral and sociocultural elements.) Exposes students to an overview of the various psychoactive substances, multiple theoretical models of substance abuse and dependence, and resulting medical, social and legal consequences. Focuses on treatment of substance abuse prevention, diagnosis, intervention, treatment and support systems.

RHAB 522 Clinical Evaluation, Assessment and Treatment Planning in Substance Abuse Rehabilitation
Semester course; 3 lecture hours. 3 credits. Prerequisite: RHAB 521. Stresses development of professional competencies. Focuses on systematic approach to screening and on-going assessment; diagnostic criteria for dependence and abuse; testing and interviewing; co-morbidity; collaborative approaches to individualized clinical treatment planning; awareness of treatment resources.

RHAB 523 Contemporary Issues in Substance Abuse Treatment and Recovery
Semester course; 3 lecture hours. 3 credits. Prerequisite: RHAB 521. Examines current issues and research in the field. Includes topics such as denial, physical dependence, intervention; lifelong nature of recovery, support needs, relapse prevention; legal, political and ethical issues; special populations (e.g., physical disability); poly-drug abuse; perinatal addiction; program administration; professional readiness.

RHAB 525 Introduction to Rehabilitation Counseling
Semester course; 3 lecture hours. 3 credits. Provides an overview of history, philosophy, legislation, organizational structure and trends in the rehabilitation profession. Focuses on attitudinal, social and environmental barriers to the inclusion of people with disabilities; professional identity, roles and functions; CRC Code of Ethics; CRC Standards of Practice; and career options.

RHAB 533 Directed Readings in Rehabilitation
Semester course; 1-3 credits. May be repeated for a maximum of 6 credits. Provides intensive study in one or more topical areas of rehabilitation through directed readings under the supervision of a faculty member.

RHAB 611 Counseling Theories in Rehabilitation
Semester course; 3 lecture hours. 3 credits. Provides an overview of history, philosophy, legislation, organizational structure and trends in the rehabilitation profession. Focuses on attitudinal, social and environmental barriers to the inclusion of people with disabilities; professional identity, roles and functions; CRC Code of Ethics; CRC Standards of Practice; and career options.

RHAB 612 Group Counseling Theories and Techniques in Rehabilitation
Semester course; 3 lecture hours. 3 credits. Provides theories or groups, group structure and group dynamics, and group counseling strategies. Focuses on process observation skills. Examines applications to groups of a variety of stakeholders in rehabilitation counseling and case management.

RHAB 613 Advanced Rehabilitation Counseling Seminar
3-9 lecture hours. 3-9 credits. Prerequisites: RHAB 611 and RHAB 612 or permission of instructor. This course is designed to provide an opportunity for students to undertake a more in-depth study of selected approaches to individual and/or group counseling of rehabilitation clients. Principles and techniques relevant to vocational, educational,
and personal adjustment problems related to severe and multiple disabilities will be systematically explored and studied. Audio visual tape experience will be offered.

**RHAB 614 Counseling, Death and Loss**

Semester course; 3 lecture hours. 3 credits. Prerequisite: RHAB 611 or permission of instructor. Focuses on the psychosocial processes of adaptation to severe losses such as those occasioned by the onset of disability, death and developmental life changes. Emphasizes the knowledge and skills required by rehabilitation counselors in dealing with losses experienced by their clients.

**RHAB 623 Career Counseling and Job Placement in Rehabilitation**

Semester course; 3 lecture hours. 3 credits. Provides an overview of major theories of career development with emphasis on theories relevant to rehabilitation practice. Explores occupational information and job matching systems; career counseling techniques; and major job placement approaches and techniques with emphasis on demand-side job placement.

**RHAB 624 Appraisal and Evaluation in Rehabilitation**

Semester course; 3 lecture hours. 3 credits. Examines principles of measurement, assessment and diagnosis in rehabilitation; test selection and interpretation; accommodating individuals with disabilities in the testing process. Includes an overview of the major domains in assessment.

**RHAB 625 Research in Rehabilitation**

Semester course; 3 lecture hours. 3 credits. Examines basic principles rehabilitation research and program evaluation, including an emphasis on the critical review of published research for use in rehabilitation practice. Focuses on students understanding of the application of research and program evaluation tools to enhance the quality of rehabilitation services delivered.

**RHAB 633 Case Management in Rehabilitation**

Semester course; 3 lecture hours. 3 credits. Prerequisites: 18 completed credits in core courses. Explores benefit systems, ethics, goal development, rehabilitation planning, coordination and delivery of rehabilitation services, community resources and documentation. Focuses on critical analyses of representative disability-specific case studies; e.g., substance abuse.

**RHAB 640 Medical and Psychosocial Aspects of Disabilities in Rehabilitation**

Semester course; 3 lecture hours. 3 credits. Provides an overview of the major disabilities encountered by rehabilitation counselors. Focuses on functional limitations and the process of psychological adjustment.

**RHAB 642 Psychiatric Information for Rehabilitation Counselors**

Semester course; 3 lecture hours. 3 credits. Examines the major mental disorders, and their etiologic definition, diagnosis and classification. Reviews the prevailing multiaxial classification systems and diagnostic processes, procedures and nomenclatures currently used in clinical practice. Provides an overview of application of psychotropic medication and other treatment approaches. Includes diagnostic interviewing, tests of psychopathology and mental health treatment planning.

**RHAB 644 Alcohol and Human Behavior**

3 credits. Prerequisites: RHAB 521, RHAB 522, RHAB 523 and RHAB 695, or permission of instructor. Understanding the significance of behavior as a tool in diagnosing, treating and/or referring the addict; appreciation of particular cues to observe the predominant behavior associated with living problems and reflected by the alcohol or drug abuser.

**RHAB 654 Multicultural Counseling in Rehabilitation**

Semester course; 3 lecture hours. 3 credits. Provides an overview of multicultural counseling theories and techniques. Provides an understanding of how human development, family, gender, race and ethnicity impact upon the process of adjustment to disability.

**RHAB 681-689 Institutes and Workshops in Rehabilitation**

Orientation institutes and other short-term training programs are offered for rehabilitation counselors recruited to the rehabilitation field and for the further professional development of those already employed. Content will vary according to the aims of the institutes or workshops. Length of time and number of credits are announced prior to each institute or workshop.

**RHAB 691 Counseling Techniques in Rehabilitation**

Semester course; requires 50 hours counseling practice and 50 hours exposure to rehabilitation agencies and practice. 3 credits. Prerequisite: RHAB 611. Provides experience and practice in the basic counseling skills related to the helping process. Examines the variety of clinical settings available for professional preparation. Provides the necessary level of skill development for students to participate in internship.

**RHAB 693 Introduction to Field Experiences for Rehabilitation Counselors**

3 credits. This course provides for concurrent field experience and is designed for students who have no training or experience in interviewing and counseling in rehabilitation settings.

**RHAB 694 Job Placement in Rehabilitation**

Semester course; 3 lecture hours. 3 credits. Explores occupational information, job matching systems and job placement approaches. Focuses on demand-side job development, job seeking skills training, supported employment, transitional work and placement techniques including job analyses, ADA implementation and labor market surveys.

**RHAB 695 Supervised Clinical Practice in Substance Abuse Rehabilitation**

Semester course; 1-6 credits. (1 credit per 100 hours of supervised internship.) May be repeated to a maximum of 9 credits. Prerequisites: Completion of 24 graduate credits including RHAB 691. Requires completion of Certified Rehabilitation Counselor examination and a total of six credits for degree completion. Emphasizes mastery of substance abuse setting specific roles and functions of the professional rehabilitation counselor. Stresses ethical decision making in practice. Involves scheduled seminars and meetings with faculty and agency supervisor.

**RHAB 696 Supervised Clinical Practice in Rehabilitation Counseling**

Semester course; 1-6 credits. (1 credit per 100 hours of supervised internship.) May be repeated to a maximum of 9 credits. Prerequisites: Completion of 24 graduate credits including RHAB 691. Requires completion of Certified Rehabilitation Counselor examination and a total of six credits for degree completion. Emphasizes mastery of setting-specific roles and functions of the professional rehabilitation counselor. Stresses ethical decision making in practice. Involves scheduled seminars and meetings with faculty and agency supervisor.

**RHAB 697 Supervised Clinical Practice in Counseling**

Semester course; 1-6 credits. (1 credit per 100 hours of supervised internship.) May be repeated to a maximum of 9 credits. Prerequisites: Admission into advanced certificate in professional counseling program. Emphasizes advanced development of counseling skills pursuant to licensure or other post-master's training needs. Stresses ethical decision making in practice. Involves scheduled seminars and meetings with faculty and agency supervisor.
School of the Arts

Applied Music

APPM 571 Choral Pedagogy
Semester course; 3 lecture hours. 3 credits. Teaching competencies relative to the choral training and use of the unchanged, changing and matured voice will be stressed. Included are consideration of vocal production, pronunciation, aural skills, reading skills and stylistic interpretation.

APPM 575-576 Score Reading
Continuous courses; 2 laboratory hours. 1-1 credit. Prerequisite: APPM 274 or the equivalent. No degree credit for graduate composition majors. A progressive course in reducing scores at the keyboard, beginning with simple choral scores and progressing to full orchestra and band.

APPM 585 Opera Theatre
Semester course; 1 lecture and 4 studio hours. 2 credits. May be repeated up to four times for credit. Prerequisite: Permission of instructor. Exploration of operas through study, written research and fully staged public performances of operatic scenes and/or one-act operas.

APPM 600-level Private Instruction: Principal and Secondary Performing Mediums
Semester courses; one half-hour or 1 hour private lessons per week. 1-3 credits. Repeatable without limitations. One hour practice daily for each credit. To register for any private lesson, students must obtain a specific course number in Room 132, Performing Arts Center, or at the music table during in-person registration; music majors must consult their advisers. Extra fee required. Lessons are available in the following areas: bassoon, carillon (one credit only), cello, clarinet, conducting, composition, double bass, drum set, euphonium, flute, French horn, guitar, harp, harpsichord, oboe, organ, percussion, piano, saxophone, synthesizer, trombone, trumpet, tuba, viola, violin, vocal coaching and voice.

APPM 663 Advanced Pedagogy
Semester course; 3 lecture hours. 3 credits. Further study in pedagogical systems and techniques with emphasis on materials for intermediate and advanced-level students. Studio observation will be included. Sections: (1) piano, (2) voice, (3) organ, (4) percussion, (5) brass, (6) woodwinds and (7) strings.

APPM 670 Large Ensembles
Semester course; 3 or 4.5 laboratory hours. 0.5 or 1 credit. Each section may be repeated up to six times for credit. Auditions required for sections 1, 3, and 4. Sections: (1) orchestra, (2) University band, (3) symphonic band, (4) chorus and (5) Choral Arts Society.

APPM 671 Piano Technique Seminar
Semester course; 1 lecture hour. 1 credit. Physiology of piano playing. Alternative approaches to building and reconstructing technique.

APPM 673, 674 Piano Literature and Performance Practice
Semester course; 2 lecture hours. 2, 2 credits. To familiarize the student with a broad repertory of performing and teaching material. Discussion of approaches to styles and idioms of various periods, solution of technical and musical problems encountered in specific pieces, evaluation of various editions of piano literature.

APPM 675 Teaching Practicum
Semester course; 2 lecture hours. 2 credits. A semester of supervised studio teaching consisting of intermediate and advanced piano literature.

APPM 681 Group Piano Methods and Management
Semester course; 2 lecture hours. 2 credits. Management, methods and materials for group teaching. Includes beginning students of all ages, intermediate level students and college keyboard skills classes.

APPM 690 Small Ensembles
Semester course; 2 or 3 laboratory hours. 0.5 or 1 credit. Each section may be repeated up to six times for credit. Auditions required for all sections. Sections: (1) ensembles for new music, (2) the madrigalists, (3) collegium musicum, (4) women's chorus, (5) vocal ensembles, (6) piano ensembles, (7) accompanying, (8) percussion lab ensemble, (9) woodwind ensembles, (11) brass ensembles, (12) chamber orchestra, (13) string ensemble, (14) guitar ensembles, (15) small jazz ensembles, (16) jazz orchestra I, (17) jazz orchestra II, (18) jazz orchestra III, (19) basketball pep band.

APPM 799 Recital
Semester course; 1, 3 and 6 credits. Public presentation of a full recital or lecture recital. Content to be approved by graduate committee. Graded as "S," "U" or "F."

Art Education

ARTE 501-502 Concepts in Art Education
Continuous courses; 1 seminar and 4 studio hours. 3-3 credits. A study of the relationships among the arts and other subject areas. Seminars will include guests from the visual, performing and literary arts. ARTE 550 Art for the Exceptional Learner
Semester course; 2 lecture and 3 laboratory hours. 3 credits. A study of exceptional learners including handicapped, gifted, talented, aged and others, and their participation in and appreciation for the visual arts. Courses may include practicum and field experiences.

ARTE 553 Art and Perceptual Communication
Semester course; 3 lecture hours. 3 credits. Emphasizes the analysis of the principles of art and design that affect the perception of art, advertising and other media. Investigates light, color, perception, illusions and other related topics.

ARTE 591 Topics in Art Education
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 9 credits with different topics. The course will explore selected topics of current interests or needs relative to art education. See the Schedule of Classes for specific topics to be offered each semester.

ARTE 592, 692 Independent Study in Art Education
Semester course; 1-6 credits. Art Education majors only. Prerequisite: Approval from department chair. An in-depth study of a selected art education topic. ARTE 600 Seminar: Issues in Art Education
Semester course; 3-6 lecture hours. 3-6 credits. The course investigates contemporary issues and identifies problems in art education. Students prepare oral and written reports that explore new directions and discuss the implications for teachers and art programs.

ARTE 601 Art for Elementary Classroom Teachers
Semester course; 2 lecture and 2 studio hours. 3 credits. An inquiry into the nature of art and its importance in the elementary curriculum. Through personal experiences with art concepts and media, students learn about themes, form and expression and develop a broader understanding of the value of art for children.

ARTE 611, 612 Literature in Art Education
Semester courses; 3 lecture hours. 3, 3 credits. Review, analysis and assessment of significant historical and contemporary writings in art education and related fields.

ARTE 652 Art Supervision and Administration
Semester course; 3 lecture hours. 3 credits. Exploration of the duties and responsibilities of the public school art supervisor and administrative positions in art education within various organizations or institutions.

ARTE 665 Curriculum Development and Evaluation
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 6 credits. A review of curriculum development including: needs assessment, determination of goals and
objectives, curriculum writing, evaluation, and feedback processes. Theoretical approaches in the visual arts will be studied and curriculum models designed, developed and analyzed.

ARTE 670 Technology in Art Education
Semester course; 2 lecture and 3 studio hours. 3 credits. Students examine diverse aspects of new technologies in relation to art programs. These aspects include media and computer-assisted learning, and applications of computer graphics and other technology to artistic expression.

ARTE 680 Teaching Laboratory
Semester course; 3 lecture hours. 3 credits. Observations and experimental teaching experiences with children in art. Group discussions and evaluation of ideas, objectives and methods.

ARTE 690 Issues and Methods of Inquiry in Art Education
Semester course; 3 lecture hours. 3 credits. Readings and discussions of studies in art education and research emphasizing possibilities for implementation by art teachers. Methods of research in the field will be reviewed and sample research proposals will be developed by the students.

ARTE 691 Topics in Art Education
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 9 credits with different content. The course will explore selected topics of current interests or needs relative to art education. See Schedule of Classes for specific topic to be offered each semester.

ARTE 799 Thesis
Semester course; 1-6 credits. May be repeated. Prerequisite: Completion of all formal course work, candidacy and approval of the department chair. Preparation of a thesis is based upon independent research.

Art History

ARTH 502 Historical Preservation and Architectural History
Semester course; 3 lecture hours. 3 credits. An introduction to the methods or research, record keeping and reporting used in architectural history, and to the evolution of the discipline, especially in relation to historic preservation.

ARTH 504 Advanced Studies in Prehistoric and Ancient Art
Semester course; 3 lecture hours. 3 credits. An advanced, detailed study of a selected aspect of prehistoric and ancient cultures, such as in Africa, Asia, Europe or the Americas. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 505 Advanced Studies in Greek, Etruscan and Roman Art and Architecture
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, detailed study of a selected aspect of the art and ideas of the classical Greek and Roman cultures, including the Etruscans. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 519 Advanced Studies in Renaissance Art and Architecture
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, detailed study of a selected aspect of the development of the art and ideas of the Proto-Renaissance, Early Renaissance or High Renaissance in Europe or Latin America. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 524 Advanced Studies in Baroque and 18th-century Art and Architecture
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, detailed study of a selected aspect of the development of the art and ideas of England, France, the low countries, Italy, Spain, Latin America, Germany and Austria during the Baroque period and/or 18th century. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 529 Advanced Studies in 19th-century Art and Architecture
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, detailed study of a selected aspect of the development of the art and ideas of the 19th-century including Neoclassicism, Romanticism, Realism, Impressionism in Europe and/or America. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 530 Guided Study Abroad
Semester course; 1-6 credits.

ARTH 539 Advanced Studies in 20th-century Art and Architecture
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, detailed study of a selected aspect of the development of the art and ideas of the 20th century in Europe and/or America. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 542 Advanced Studies in the Architecture of Richmond
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 6 credits. An advanced, detailed study of a selected aspect of the development of the architecture of the city of Richmond. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 544 Advanced Studies in Art and Architecture of the United States
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, detailed study of a selected aspect of the development of the art and ideas of the United States. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 549 Advanced Studies in the Art and Architecture of Asia
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, detailed study of a selected aspect of the development of the art and ideas of India, China, Korea, Japan, Southeast Asia or the Middle East. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 552 Art and Architecture of Central, Eastern and Southern Africa
Semester course; 3 lecture hours. 3 credits. A study of the major art-producing cultures of Central Africa, including the Cameroon, Gabon and Zaire; East Africa including Kenya, Tanzania and Mozambique; and Southern Africa, Bushman art, prehistoric cave paintings and rock engravings.

ARTH 554 Advanced Studies in African or Oceanic Art and Architecture
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 6 credits. An advanced, detailed investigation of a selected aspect of the development of the art and ideas of African or Oceanic cultures. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 555 Advanced Studies in Aesthetics and Art Theory
Semester course; 3 lecture hours. 3 credits. An advanced, detailed investigation of aesthetic theories and concepts in art.

ARTH 556 Advanced Studies in Ideas and Criticism in Art
Semester course; 3 lecture hours. 3 credits. An advanced, detailed examination of specific concepts in the literature of art criticism with particular emphasis on the principle writings of leading American critics.

ARTH 569 Advanced Studies in Museum Methods
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 9 credits. Advanced instruction in the major aspects of museum administration. Lectures by museum personnel and workshops in a variety of museums. A major research project is required.

ARTH 571 Advanced Studies in Film Theory
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, detailed examination of selected topics in the history of film. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 575 Advanced Studies in the History of Photography
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, detailed examination of selected topics in the history of photography. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 580 Registration Procedures for Museums
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. A study of the standard registration procedures and the current vocabulary employed by the profession. Professional ethics will be stressed to enable the students to become more fully aware of the importance within the museum system.

ARTH 581 Museum Exhibitions
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. A study of exhibitions for museums including design, fabrication, lighting, brochures, invitations and publications.

ARTH 582 Educational Program and Public Relations for Museums
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. A study of programming for an art center/museum, including organization of permanent displays, special exhibitions, lectures, docent programs for children and adults and traveling exhibition services. Special emphasis
will be placed on the use of audiovisual materials and techniques in the exhibitions and interpretation programs, as well as the techniques of publishing information, including press releases, use of television, radio, newspapers and scholarly publications.

**ARTH 583 Curatorship and Connoisseurship**  
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. A study of the curator’s relationship and responsibilities to the museum system, research methods, methods of acquisition, organization of museum reference library (including slides and other audiovisual materials), exhibition catalogues, clippings and file and computer retrieval systems.

**ARTH 584 Museum Administration**  
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARTH 464, 465 and/or permission of instructor. A study of museum organization, including staff organization and relationship of director to board, building and grounds, heating and humidity control, guarding and fire control, special installations and shops, membership programs, museum finances for operation and acquisition funds, grants, promotion, development and overall responsibility to the community and profession.

**ARTH 590 Art Historiography and Methodology**  
Semester course; 3 lecture hours. 3 credits. Basic methodology for beginning art history graduate students. An examination of the traditional research methods of the art historical discipline, geared to familiarize students with standards in research and scholarship.

**ARTH 591 Topics in Advanced Art and Architectural History**  
Semester course; variable hours. 1-6 credits. May be repeated for a maximum of 9 credits. Prerequisite: Permission of instructor. An in-depth study of a particular aspect of the art and architecture of both Old and New World cultures. Course consists exclusively of extended off-campus trips to sites and collections throughout the United States and abroad. See the Schedule of Classes for specific topics to be offered each semester.

**ARTH 593 Advanced Museum Internship**  
Semester course; 9 to 18 studio hours. 3 to 6 credits. May be repeated for a maximum of 9 credits. Prerequisite: Permission of instructor, chair of the graduate committee and/or chair of the Department of Art History. Advanced fieldwork in a local, regional or national museum.

**ARTH 602 Native American Art and Architecture of the Southwest United States**  
Semester course; 3 lecture hours. 3 credits. A study of the major prehistoric and historic native cultures of the Southwest, considered in terms of the characteristics that distinguish them from each other and that show continuity to modern forms. Emphasis is placed on use of modern Pueblo and non-Pueblo art forms as models for interpreting prehistoric forms of the Anasazi, Hohokam, Mogollon, Navajo and related cultures.

**ARTH 691 Topics Concerning the Yoruba Presence in the Americas**  
Semester course; 3 lecture hours. 3 credits. May be repeated. An examination of Yoruba-inspired cultural and artistic traditions in North and South America and the Caribbean. See the Schedule of Classes for specific topics to be offered each semester.

**ARTH 699 Museum Project**  
Semester course; 3-6 credits. Prerequisite: Permission of departmental graduate committee and chair of the department of art history. The planning, mounting and documentation of a major exhibition on campus or in a local/regional museum.

**ARTH 714 Seminar in Pre-Columbian Art and Architecture**  
Semester course; 3 lecture hours. 3 credits. May be repeated. Prerequisite: Permission of the instructor. Advanced research on specific topics related to the study of pre-Columbian art in the Mesoamerican and Andean regions.

**ARTH 752 Art and Architecture of Nigeria**  
Semester course; 3 lecture hours. 3 credits. A study of the culture and traditional art forms of Nigeria, from around 500 B.C. to present, including architecture, sculptural works in wood, stone, ivory and metal, royal attire, jewelry and weaponry. Special emphasis will be placed upon the art of the Yoruba and Benin bronzes.

**ARTH 759 Seminar in Aesthetics, Theory and Criticism of Art and Architecture**  
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 6 credits. An advanced, detailed study of selected topics of aesthetics, art theory and criticism in a seminar situation. See the Schedule of Classes for specific topics to be offered each semester.

**ARTH 761 Seminar in Latin American Renaissance Art and Architecture**  
Semester course; 3 lecture hours. 3 credits. May be repeated. Prerequisite: Permission of the instructor. Advanced research on specific topics related to the study of Renaissance art in the Caribbean, Mexico, Central and South America.

**ARTH 762 Seminar in Latin American 17th- and 18th-century Art and Architecture**  
Semester course; 3 lecture hours. 3 credits. May be repeated. Prerequisite: Permission of the instructor. Advanced research on specific topics related to the study of Baroque and Rococo art and architecture in the Caribbean, Mexico, Central and South America.

**ARTH 780 Aspects in Christian Iconography**  
Semester course; 3 lecture hours. 3 credits. Seminar: the study of meaning in the visual arts of Europe from the Middle Ages to the Neoclassical period. Students will analyze special themes of a Christian or Classical derivation and study major cultural shifts within a broader historical perspective.

**ARTH 781 Aspects of Buddhist Iconography**  
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Seminar: research into the origins and expansion of Buddhist art in Asia.

**ARTH 782 Aspects of Hindu Iconography**  
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Seminar focusing on research into the origins and expansion of Brahmanical Hindu art in Asia.

**ARTH 789 Problems in Advanced Art and Architectural History**  
Semester course; 3 lecture hours. 3 credits. May be repeated. Seminar for scholarly research and discussion of specific issues.

**ARTH 791 Topics in Early Modern Art**  
Semester course; 3 lecture hours. 3 credits. May be repeated. An in-depth investigation of American and/or European art and architecture of the early 20th century. See the Schedule of Classes for specific topics to be offered each semester.

**ARTH 797 Directed Research Project**  
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits. Prerequisite: Permission of instructor, coordinator of graduate studies and chair of the department of art history. Advanced individual work on subject to be formulated by student and instructor.

**ARTH 899 Dissertation Research**  
Semester course; variable hours. Variable credit. May be repeated. A minimum of 6 semester hours. Prerequisite: Completion of all formal course work, comprehensive examinations, foreign language examination, and approval of the departmental chair of graduate studies and department chair. Preparation of a thesis based on independent research.

**Arts**

**ARTS 592, 692 Individual Projects/Fieldwork**  
Semester courses; 1-6 credits. By appointment with director of graduate studies after approval by department chair. (Obtain individual research project form from the dean’s office prior to enrollment.) Individual work for graduate students.

**ARTS 601-602 Seminar in Art**  
Continuous courses; 3-3 credits. Discussion and research in the visual arts providing experience and involvement in the various studio areas for students not concentrating in these areas.

**ARTS 690 Methods of Art Research**  
Semester course; 2 credits. Review of selected research methods relevant to the composition of a thesis in the student’s master’s degree area. Preparation of a prototype thesis concludes course work.

**ARTS 705, 706 Research in the Arts**  
Semester courses; 3, 6 credits. By appointment with director of graduate studies after approval by department chair. (Obtain individual research project form from the dean’s office prior to enrollment.) Individual research for graduate students.
Communication Arts and Design

CARD 567 Visual Interface Design
Semester course; 3 lecture and 3 studio hours. 4 credits. Prerequisite: Permission of instructor. A course concentrating on the visual design and development of human-computer interface systems. Emphasis is placed on visual design processes and methods in the diverse arena of user interface design.

CARD 591 Advanced Studio Topics in Visual Communications
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for a maximum of 6 credits. Prerequisite: permission of instructor. Topical studio focusing on research and experimentation in specialized visual communication media.

CARD 593 Visual Communications Internship
Semester course; 3 or 6 credits. May be repeated to a maximum of 6 credits. Prerequisite: Permission of chair required. Supervised study in cross-disciplinary visual communications research projects to integrate theory with practice. Training is provided under the direction and supervision of qualified professional practitioners and a faculty adviser.

CARD 611 Visual Communications Workshop
Semester course; 18 studio hours. 9 credits. May be repeated. A team-taught studio course focusing on the philosophical, communicative, and aesthetic relationships of visual communications problem solving and the effective articulation of concepts.

CARD 621 Visual Communications Seminar
Semester course; 3 lecture hours. 3 credits. May be repeated. A detailed examination of selected theoretical, historical, aesthetic, and social areas of concern to the designer. Scholarly research, critical analysis, and discussion are expected.

CARD 631 Visual Communications Teaching Practicum
Semester course; 1 lecture and 6 practicum hours. 3 credits. Prerequisite: Permission of department chair. Observation, instruction, and practice to develop skills in the design, organization, and conduct of courses in visual communications. Explores multiple teaching strategies, student development, learning styles, and evaluation techniques.

CARD 692 Visual Communications Research/Individual Study
Semester course; 6 studio hours. 3 credits. May be repeated. The structuring, research, execution, and presentation of an independent project in visual communications under the guidance of a faculty adviser.

CARD 697 Creative Project
Semester course; 1-6 credits. May be repeated. Prerequisites: successful completion of 30 credit hours of graduate study and permission of department chair. A course based on exploration and testing of original and expressive ideas in visual communications. Executed under the supervision of a graduate adviser and review committee.

CARD 799 Thesis
Semester course; 1-6 credits. May be repeated. Prerequisites: successful completion of 30 credit hours of graduate study and permission of department chair. Preparation of a thesis based on carefully planned and executed independent research or study under the supervision of a graduate adviser and thesis committee. Research emphasis must be placed on problems/processes that represent significant study in design.

Crafts

CRAF 547 Ceramic Technology
Semester course; 3 lecture hours. May be repeated. See the Schedule of Classes for specific topics to be offered each semester.

CRAF 591 Special Topics and Practicum
Semester course; 1-3 credits. May be repeated. Prerequisite: Permission of instructor. A topical seminar/workshop offered in a variety of craft subjects or issues not included in the regular catalog. See the Schedule of Classes for specific topics to be offered each semester.

CRAF 601 Metal or Jewelry
Semester course; 9, 18 or 27 studio hours. 3, 6 or 9 credits. May be repeated. Personal investigation of materials, processes, and attitudes relating to the creative production of metal and/or jewelry forms.

CRAF 621 Furniture Design
Semester course; 9, 18 or 27 studio hours. 3, 6 or 9 credits. May be repeated. Design, research, and experimentation in wood and varied materials, relating to a body of work demonstrating the student’s mastery of material.

CRAF 641 Ceramics
Semester course; 9, 18 or 27 studio hours. 3, 6 or 9 credits. May be repeated. Problems in the design and production of functional and nonfunctional ceramic objects as well as study of experimentation in ceramic technology and kiln design.

CRAF 651 Glassworking
Semester course; 9, 18 or 27 studio hours. 3, 6 or 9 credits. May be repeated. Prerequisite: Permission of instructor. Investigation of and experimentation with the ideas, material, and processes relative to the production of glass forms.

CRAF 661 Textiles
Semester course; 9, 18 or 27 studio hours. 3, 6 or 9 credits. May be repeated. Work in contemporary and traditional textile techniques.

CRAF 690 Graduate Seminar
Semester course; 1 or 3 lecture hours. 1 or 3 credits. May be repeated. Degree requirement for graduate students in the Department of Crafts. A weekly seminar for the purpose of discussing contemporary issues in the arts as they affect the artist-craftsperson.

Design

DESI 601 Interdisciplinary Design Seminar
Semester course; 3 lecture hours. 3 credits. An introductory seminar for beginning graduate students across the three sub-specialty areas that examines the mission of the contemporary designer and the technological, psychological, and aesthetic resources. Professional designers, educators from other fields on campus, and resource people from business and industry will participate.

DESI 602 Advanced Design Seminar
Semester course; 3 lecture hours. 3 credits. May be repeated. An advanced seminar in which students and faculty from the three sub-specialty areas meet and discuss the professional and conceptual aspects of interdisciplinary design activity. Students will draw upon past knowledge and current investigations.

DESI 603 Design and Visual Communication Education
Semester course; 3 lecture hours. 3 credits. This course will explore the philosophical, informational, and technical aspects of design education.

Interior Design

IDES 591 Topics in Interior Design
Semester course; 3 lecture hours. 3 credits. May be repeated. Prerequisite: Consent of instructor. Explores selected topics of current and relevant interest in interior design. Topics will vary each semester and focus on the needs of the student.

IDES 601, 602, 603 Graduate Design Studio
Semester course; 12 studio hours. 6 credits. Prerequisite: Consent of graduate coordinator and instructor. Interior design majors only. Provides individualized advanced studio for designing in specialized areas of interior environments. Topics will vary each semester and focus on the needs of the student.

IDES 621 Research Methods in Design
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: Consent of instructor. Familiarizes students with the different types of research methods including design, historical, educational, and behavioral: includes information on interior design thesis projects and research.

IDES 622 Design Research
Semester course; 3 credits. Work with graduate coordinator or adviser. Emphasizes thesis design research; students prepare a project proposal, conduct investigative research and organize research material via written documentation.

IDES 623 Advanced Design Studies
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: Consent of instructor. Interior design majors only. Familiarizes students with the expanding body of knowledge on design studies related to interior environments including theory, emerging trends, and future issues.

IDES 693 Interior Design Internship
Semester course; 6 or 12 studio hours. 3 or 6 credits. Prerequisite: Consent of instructor. Interior design majors only. Provides
supervised practical work experiences that are coordinated with professional interior designers under the guidance of interior design faculty. Formal arrangements must be made.

IDES 699 Research-Design Project - Thesis
Semester course; 2 or 6 studio hours. 1, 3, 6 or 9 credits. May be repeated. Prerequisite: Approval of Departmental Review Committee. The project must test an original design theory synthesized through the development of a design process, investigative research, and an individual project of complex scale and scope.

Music Composition

MUSC 611-612 Analysis for Performance and Composition
Continuous courses; 2 lecture hours. 2 credits. Analysis of the organization, combination, and manipulation of elements devices of music from the 18th century to the present with demonstration of this knowledge through performance.

MUSC 620 Composition Seminar
Semester course; 2 lecture hours. 2 credits. May be repeated up to four times for credit. Discussion, analysis, and criticism of selected compositions pertinent to the improvement of student skills and understanding.

Music Education

MUED 583 Special Workshop in Music Education
Semester course; 0.5-3 credits. Flexible term courses on selected aspects of music education. See the Schedule of Classes for specific topics to be offered each semester.

MUED 591 Topics in Music Education
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits with different topics. Flexible semester courses in selected topics in music education philosophy, curriculum, integrated and interdisciplinary arts, technology and selected topics of current interest or needs relative to music education. See the Schedule of Classes for specific topics to be offered each semester.

MUED 600 Seminar in Music Education
Semester course; 3 lecture hours. 3 credits. May be repeated up to two times with different topics. Investigation of contemporary issues and problems in music education. Students will present oral reports and written papers, which explore new directions and implications for music educators and music education programs.

MUED 620 Introduction to Research in Music Education
Semester course; 3 lecture hours. 3 credits. Development of fundamental skills necessary to understand and evaluate research in music education. Focuses on the basic principles, concepts and techniques of research methodology applied specifically to music education. Includes introduction to quantitative, qualitative, ethnographic and historical methodology.

MUED 676 School Music Supervision and Administration
Semester course; 2 lecture hours. 2 credits. The study of the organization, curriculum, course content, administration, and personnel problems in public school music.

MUED 799 Thesis
Semester course; 1-3 credits. May be repeated. Prerequisite: Permission of the music education supervisor. Preparation of a thesis based on independent research.

Music History, Literature and Theory

MHIS 513 Arranging
Semester course; 3 lecture hours. 3 credits. Practical, technical, and conceptual considerations of arranging and transcribing for vocal and instrumental groups will be explored. Students will demonstrate competence in these creative areas to the optimum level of school and/or church music organizations.

MHIS 551-552 Orchestral Repertoire
Semester courses; 1 lecture or 1 lecture and 2 laboratory hours. 1 or 2 credits. Performance and study of selected major symphonic works from historical, analytical, and stylistic perspectives. Research reports will include comparisons of interpretations. Repertoire will consist of basic audition pieces selected by choruses. Laboratory sessions will utilize available instrumentation for performance.

MHIS 566 Jazz History and Analysis
Semester course; 3 lecture hours. 3 credits. An examination of the evolution of jazz from its beginnings through the Swing Era. Students will transcribe and analyze improvised solos and compositions by the tradition's principal innovators.

MHIS 591 Topics in Music
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits with different topics. Flexible term courses in selected aspects of music performance, theory, literature, or history. See the Schedule of Classes for specific topics to be offered each semester.

MHIS 592, 692 Individual Project
Semester courses; 1-6 credits. Prerequisites: permission of supervising faculty member, adviser and department chair. Open only to degree-seeking graduate students in music. Individual work in an area not otherwise available to the student.

MHIS 615 Seminar in Music Theory
Semester course; 2 lecture hours. 2 credits. May be repeated up to four times with different topics. Topical discussions and relevant research appropriate to the principal eras of music development.

MHIS 650 Seminar in Music History
Semester course; 2 lecture hours. 2 credits. May be repeated up to four times with different topics. Prerequisite: MHIS 690. An intensive study of a limited phase or segment of music history through examination of relevant materials and extended class discussion.

MHIS 666 20th-century Music
Semester course; 2 lecture hours. 2 credits. Prerequisite: MHIS 690 (may be taken concurrently). Impressionistic, expressionistic, neoclassic, and neoromantic influences and styles of music. Development of new sound-generating techniques and methods for ordering the new tonal materials.

MHIS 667 Music of the Middle Ages and the Renaissance
Semester course; 2 lecture hours. 2 credits. Prerequisite: MHIS 690 (may be taken concurrently). Principal developments from the first through the 16th centuries. Sacred and secular monophonic, homophonic, and polyphonic forms and styles; the development of instrumental idioms and forms.

MHIS 668 Music of the Baroque
Semester course; 2 lecture hours. 2 credits. Prerequisite: MHIS 690 (may be taken concurrently). Principal developments, c. 1590-1750; accompanied monody and the beginning of opera; forms and styles of sacred and secular compositions.

MHIS 669 Music of Rococo and Classical Eras
Semester course; 2 lecture hours. 2 credits. Prerequisite: MHIS 690 (may be taken concurrently). Major development in sacred and secular forms and styles, c. 1730-1828; social and artistic influences on music; dominance of instrumental music; Mozart, Beethoven, and the German Symphony.

MHIS 670 Music of the Romantic Era
Semester course; 2 lecture hours. 2 credits. Prerequisite: MHIS 690 (may be taken concurrently). Influence of the Romantic Era on concepts of musical forms and styles; the development of the art song, the growth of opera, the exploitation of instruments and tonality.

MHIS 690 Bibliography and Methods of Research
Semester course; 2 lecture hours. 2 credits. A course to introduce graduate students to the chief bibliographic materials in music and music education to help develop skills of research and writing necessary to produce a thesis or other formal research paper.

MHIS 798 Research Project
Semester course; 2 credits. Corequisite: APPM 799 Final research or expository document for performance and composition majors. Content to be approved by graduate committee.

Painting and Printmaking

PAPR 525 Issues in Contemporary Visual Arts
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 6 credits. Prerequisite: Painting and printmaking majors only. The investigation of content and meaning of major directions in contemporary art as they relate to the studio. Students will relate their own work to major movements in contemporary visual art.

PAPR 527, 528 Art and Critical Theory
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisite: General art history or equivalent. Major themes in art criticism and theory from 1940 to the present. This course provides an introduction to the literature of art criticism as well as artists’ writings in relation to studio production.

PAPR 591 Topics in Painting and Printmaking
Semester course; 1-4 credits. May be repeated for a maximum of 9 credits with different content. This course will explore selected topics of current interests or needs relative to painting and printmaking. See the
Photography and Film

PHTO 500 Photographic Studio and Seminar
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisite: Permission of instructor. A seminar that examines the technical and aesthetic components of photographic and filmmaking processes and the language and theories of photography and film criticism.

PHTO 501 Photographic Studio
Semester course; 6 or 12 studio hours. 3 or 6 credits. May be repeated. Prerequisite: Nonmajors may enroll with permission of instructor. Students will engage in appropriate theoretical, experimental, or historical research in a specific area.

PHTO 690 Seminar in Photography and Film
Semester course; 3 lecture hours. 3 credits. May be repeated. Examination of contemporary issues and developments in photography and film. Students will have a chance to discuss their work and the work of others.

PHTO 693 Fieldwork, Internship
Semester course; 6 or 12 studio hours. 3 or 6 credits. May be repeated. Professional field experience in the theoretical and practical applications of photography and/or film through cooperative organizations.

PHTO 699 Graduate Exhibition
Semester course; 1 or 3 lecture hours. 1 or 3 credits. To be taken the last semester of graduate program with approval of the department chair and review of student's record. Students in this course will prepare and mount an exhibition of their own work. In addition, they will be asked to provide complete documentation of the sources and ideas presented in the exhibition.

Sculpture

SCPT 500, 600 Graduate Sculpture
Semester course; 4, 8 or 12 studio hours. 2, 4 or 6 credits. May be repeated. Emphasis on individual creative production with periodic exposure of student's work and ideas to the critical attention of the teaching faculty of the department of sculpture and other graduate students.

SCPT 517 Seminar in Contemporary Sculpture
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. A forum for consideration and discussion of recent developments in the field.

SCPT 591 Topics in Sculpture
Semester course; variable hours. 1-4 credits. May be repeated for a maximum of 12 credits. This course will explore selected topics of current interests or needs relative to sculpture. See the Schedule of Classes for specific topics to be offered each semester.

SCPT 690 Graduate Seminar
Semester course; 4 lecture hours. 4 credits. May be repeated. Degree requirement for graduate students in the Department of Painting and Printmaking. Weekly seminar for the purpose of discussion of recent artistic developments in painting and printmaking. Critiques dealing with student work will take place.

Theatre

THEA 501, 502 Stage Voice and Speech
Semester course; 3, 3 credits. May be repeated with permission of instructor. Provides advanced work on breathing, support and projection of the voice with application to the demands of classical texts and/or dialects.

THEA 505 Advanced Scene Design III
Semester course; 1 lecture and 4 studio hours. 3 credits. Prerequisites: THEA 306 and permission of instructor. Intensive study of the professional standards and practices expected of scene designers.

THEA 506 Advanced Scene Design IV
Semester course; 1 lecture and 4 studio hours. 3 credits. Prerequisites: THEA 505 and permission of instructor. Continued intensive study of the professional standards and practices expected of scene designers.

THEA 508 Scene Painting
Semester course; 10 studio hours. 3 credits. May be repeated with permission of instructor for up to 12 credits. Study of the materials and techniques of scenic painting as well as the practices and expectations of those pursuing careers as scenic artists.

THEA 510 Theatre Historiography
Semester course; 3 lecture hours. 3 credits. Study of how theatre history is documented and researched, and the theoretical perspectives that inform its writing.

THEA 513-514 Acting Styles
Continuous courses; 6 studio hours. 3-3 credits. Prerequisite: Permission of instructor. Open only to theatre majors upon satisfactory audition. A study of the history and theory of acting styles from the Greeks to the present.

THEA 517 Physical Acting
Semester course; may be repeated for a total of 12 credits. Prerequisite: Permission of instructor. Exploration and discovery of the principles of movement and their practical application to the stage. Emphasis on character development, solo and group scene work, physical comedy, and stage combat.

THEA 519 Theatre Pedagogy
Semester course; 3 lecture hours. 3 credits. Theory and practice in the teaching of college-level theatre.

THEA 593 Professional Internship
Semester course; 3-9 credits. May be repeated. Prerequisite: Permission of department chair. Majors only. A practicum in theatre conducted in cooperation with selected professional or semiprofessional theatre organizations.

THEA 603 Dramatic Literature and Theory
Semester course; 1 lecture and 4 studio hours. 3 credits. Multicultural study of selected plays in the history of dramatic literature, criticism and theory.

THEA 604 Modern Theatre: Theory and Practice
Semester course; 3 lecture hours. 3 credits. Seminar in the performance practices, texts and theories that have shaped the theatre throughout the 20th century.

THEA 605-606 Advanced Studies in Stage Design
Continuous courses; 1 lecture and 4 studio hours. 3-3 credits. May be repeated. A study of selected topics in contemporary theory and practice of scenic design.

THEA 607 Problems in Scenic Techniques
Semester course; 1 lecture and 4 studio hours. 3 credits. Prerequisite: Permission of instructor. An advanced, detailed study of selected problems in contemporary theory and practice of scenic technique.

THEA 609 Seminar in Production Process
Semester course; 1 lecture and 4 laboratory hours. 3 credits. May be repeated with different topics for a maximum of 9 credits. Students and faculty in design, technical theatre, and performance working together in studio situations to identify and solve problems relating to the planning, preparation, and realization of productions.

THEA 613 Advanced Problems in Acting
Semester course; 3 credits. May be repeated with permission of instructor. Focus on acting problems related to the actor's needs to develop proficiency in craft areas.

THEA 509 Theatre History
Semester course; 3 lecture hours. 3 credits. Study of modern theatre practice, dramatic literature and theory from the development of naturalism through the late 20th century.

THEA 602 Technical Arrangements
Semester course; 3 lecture hours. 3 credits. Study of the materials, technical research and the aesthetic suitability of design to medium.

THEA 608 Technical Experience in the Theatre
Semester course; 6 or 12 studio hours. 3 or 6 credits. May be repeated. Specialization in one printmaking medium with emphasis upon technical research and the aesthetic suitability of design to medium.

THEA 615 Graduate Printmaking
Semester courses; 6 or 12 studio hours. 3 or 6 credits. May be repeated. Specialization in one printmaking medium with emphasis upon technical research and the aesthetic suitability of design to medium.

THEA 621 Graduate Drawing
Semester course; 6 studio hours. 3 credits. May be repeated. A studio class with criticalism. Special attention is given to contemporary concepts. Permission of instructor required for non-painting and printmaking majors.

THEA 690 Graduate Seminar
Semester course; 1 or 3 lecture hours. 1 or 3 credits. May be repeated. Degree requirement for graduate students in the Department of Painting and Printmaking. Weekly seminar for the purpose of discussion of recent artistic developments in painting and printmaking. Critiques dealing with student work will take place.

THEA 691 Graduate Studio
Semester course; 1 lecture and 4 studio hours. 3 credits. May be repeated. Degree requirement for graduate students in the Department of Painting and Printmaking. Weekly seminar for the purpose of discussion of recent artistic developments in painting and printmaking. Critiques dealing with student work will take place.

THEA 692 Graduate Workshop
Semester course; 1 lecture and 4 studio hours. 3 credits. May be repeated. Degree requirement for graduate students in the Department of Painting and Printmaking. Weekly seminar for the purpose of discussion of recent artistic developments in painting and printmaking. Critiques dealing with student work will take place.

THEA 693 Graduate Fieldwork
Semester course; 1 lecture and 4 studio hours. 3 credits. May be repeated. Degree requirement for graduate students in the Department of Painting and Printmaking. Weekly seminar for the purpose of discussion of recent artistic developments in painting and printmaking. Critiques dealing with student work will take place.

THEA 694 Graduate Internship
Semester course; 1 lecture and 4 studio hours. 3 credits. May be repeated. Degree requirement for graduate students in the Department of Painting and Printmaking. Weekly seminar for the purpose of discussion of recent artistic developments in painting and printmaking. Critiques dealing with student work will take place.
THEA 621, 622 Problems in Costume Design
Semester courses; 2 lecture and 2 studio hours. 3, 3 credits. May be repeated. Prerequisite: Permission of instructor. An advanced study in specific problems in costume design.

THEA 623, 624 Advanced Studies in Modern Drama
Semester course; 3 lecture hours. 3, 3 credits. Intensive, detailed studies of selected subjects in major 19th- and 20th-century drama.

THEA 630 Production
Semester course; 6 laboratory hours. 3 credits. May be repeated. The design, rehearsal, and performance of dramatic works.

THEA 640, 641 Advanced Theatre Projects
Semester course; 1 or 2 lecture and 4 or 8 laboratory hours. 3 or 6 credits per semester. May be repeated. Individual or group projects in acting, directing, costume design, stage design or dramaturgy.

THEA 651 Advanced Design Studio
Semester course; 1 lecture and 4 laboratory hours. May be repeated. Intensive individual training in design and presentation processes as they apply to contemporary professional production.

THEA 661, 662 Problems in Stage Directing
Semester courses; 3 lecture hours. 3, 3 credits. May be repeated. Prerequisite: Permission of instructor. An advanced, detailed study of selected aspects of directing techniques for the stage.

THEA 693 Colloquium and Practical Training
Semester course; 2 lecture and 2 studio hours. 3 credits. May be repeated for a maximum of 12 credits. Literary, historical, and theoretical studies together with specialized voice and movement training related to dramatic works in production.

THEA 694 Theatre Pedagogy Professional Internship
Semester course; 1 or 3 lecture hours. 1, 3 or 6 credits. May be repeated. Prerequisites: THEA 519 and permission of the graduate adviser in theatre. Research, design, and either implementation or thoroughly planned implementation of a curricular research and development project of relevance to a formal speech and/or theatre pedagogy program.

THEA 697 Research and Special Problems in Theatre
Semester course; 1 or 3 credits. May be repeated with permission of graduate adviser. Individually directed study and research under faculty supervision on approved research problems or projects in theatre.

THEA 698 Creative Project
Semester course; 3 credits. Provides the culminating performance or design experience in the student's degree emphasis. Adjudicated by the faculty.

THEA 699 Creative Project Evaluation
Semester course; 3 credits. Provides the student in acting, directing, costume design, and stage design the opportunity to document and evaluate the creative project. Defended before a committee of the faculty.

THEA 791 Seminar in Special Issues in Theatre
Semester course; variable hours. 1-3 credits per semester. May be repeated for a maximum of 9 credits. Prerequisite: Permission of instructor. An advanced, detailed study of selected, contemporary issues not included in the regular curriculum. See the Schedule of Classes for specific topics to be offered each semester.

THEA 799 Thesis
Semester course; 1-6 credits. May be repeated. Prerequisites: Permission of the department graduate studies adviser and department chair. Preparation of a thesis based on independent research.
School of Business

Accounting

**ACCT 506 Auditing**
Semester course; 3 lecture hours. 3 credits.
Prerequisite: ACCT 304 or equivalent with grade of "C" or higher. This course examines conceptual content and practical procedures applicable to auditing, both external and internal. Primary emphasis is placed on the theory of auditing, the objectives, methods and procedures for audits of financial statements; and the meaning of the various audit reports. The content also includes statements on auditing standards, attest standards and statistical sampling applications.

**ACCT 507 Fundamentals of Accounting**
Semester course; 3 lecture hours. 3 credits. Theoretical and technical facets of financial and managerial accounting for business. This is a graduate foundation course.

**ACCT 513 Financial Reporting**
Semester course; 3 lecture hours. 3 credits. Prerequisite: A grade of "C" or higher in ACCT 304. Financial auditing for complex business relationships, including business combinations, consolidated financial statements, restatement of foreign financial statements, foreign currency transactions, derivative instruments, partnerships, accounting and pension accounting. Emphasis is on current issues confronting accountants and financial reporting and the potential impact of these issues on business entities.

**ACCT 601 Financial Accounting Theory**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 507 or equivalent. The historical development of accounting thought and the way it has been influenced by social, political, and economic forces. Analysis of the structure and methodology emphasizes objectives, postulates, and principles. Income determination and asset valuation, in both theory and practice.

**ACCT 602 Managerial Accounting Theory**
Semester course; 3 lecture hours. 3 credits. Prerequisite: 21 semester credits in accounting (or permission of instructor). The study of cost behavior, decision making, and control are emphasized. Cost-based aspects the use of accounting information in the management process. Cost-based decision making and control systems are related to short- and long-term objectives of the firm.

**ACCT 603 Environment of Accounting**
Semester course; 3 lecture hours. 3 credits. Prerequisite: 21 credits in accounting, (or permission of instructor). The organization of the profession and accounting standard-setting bodies. Areas covered will include FASB, AICPA, SEC, other governmental regulatory agencies and current and emerging accounting issues and pronouncements.

**ACCT 604 Auditing**
Semester course; 3 lecture hours. 3 credits. Prerequisite: 21 semester credits in accounting (or permission of instructor) including ACCT 406 or equivalent. Development of auditing theory, special disclosure issues, statistical sampling, ethical, legal, and social responsibilities of external and internal auditors. Emphasis on contemporary topics in auditing.

**ACCT 605 Governmental and Not-for-profit Accounting**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 507. Budgeting, accounting, reporting, and related issues and pronouncements for governmental and not-for-profit organizations.

**ACCT 606 International Accounting**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 507. International dimensions of accounting; national differences in accounting thought and practice; problems of multinational enterprises.

**ACCT 608 Managerial Accounting Concepts**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 507 or equivalent. The use of accounting information contained in reports to managers of planning, decision making, and control are studied as accounting data are reported through the firm's information system and in special analyses.

**ACCT 609 State and Local Taxation**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 507 or equivalent. Examination of the tax problems and planning opportunities inherent in state and local taxation, with emphasis on the problems of interstate business operations.

**ACCT 662 Accounting Systems**
Semester course; 3 lecture hours. 3 credits. Prerequisites: ACCT 507 and either ACCT 307, INFO 360, or INFO 560 or equivalent. Study of accounting systems, concepts, and applications with reference to actual problems encountered in the analysis, design, implementation, use, audit, and evaluation of accounting systems in a computer environment.

**ACCT 678 Accounting Controls for Not-for-profit Organizations**
Semester course; 3 lecture hours. 3 credits. This course is for non-business students who have a need to understand and use accounting information in their professions. The basics of compiling and analyzing financial information for governmental and other not-for-profit entities will be reviewed. In addition, the use of accounting as a control method in these entities will be studied. Students will be required to investigate ways accounting relates to their particular areas of interest. May not be included in the 30 semester credits of advanced work required for any of the master's degrees offered by the School of Business.

**ACCT 679 International Taxation**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 405 or equivalent. Problems related to organization, operation, and liquidation of a partnership. Also, tax problems of Subchapter S corporations, tax-exempt organizations, private foundations and other charitable corporate forms.

**ACCT 680 Tax Research**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 682 or equivalent. Tax research methodology; the sources of tax law and their relationship to tax research.

**ACCT 681 Tax Administration**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 405 or equivalent. The Internal Revenue Service and the practices and procedures involved and/or available for the settlement of tax controversies and other elections of accounting methods.

**ACCT 682 Corporate Taxation**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 405 or equivalent. Corporate tax laws as related to the corporations involved and to individual shareholders: tax planning, operation, reorganization, and partial liquidation of corporations; corporate distributions.

**ACCT 683 Taxation of Reorganizations**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 682 or equivalent. Continuation of the study of corporate taxation, with emphasis on corporate liquidations and reorganizations as well as collapsible corporations.

**ACCT 684 Partnership Taxation**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 405 or equivalent. Tax planning approaches to the partnership concept, planning and problems related to organization, operation, and liquidation of a partnership. Also, tax problems of Subchapter S corporations, tax-exempt organizations, private foundations and other charitable corporate forms.

**ACCT 685 Taxation of Property Transactions**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 405. Tax planning in relation to comparisons of sales and exchanges as methods of acquiring and disposing of property; study of Section 1245, 1250, and 1231.

**ACCT 686 Taxation of Pensions/Deferred Compensation**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 682. Tax law related to pensions, profit-sharing, and deferred compensation plans, and the tax consequences related thereto for individuals and businesses.

**ACCT 687 Fiduciary Income Taxation**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 405 or equivalent. Tax laws relating to estates and to inter vivos and testamentary trusts. Tax planning will be stressed.

**ACCT 688 Estate and Gift Taxation**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 405 or equivalent. Concepts of gross estate, marital deduction, powers of appointment, gross gifts and transfers, exclusions, deductions, and credits; tax aspects of estate planning.

**ACCT 689 Estate Planning**
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 688. Estate planning as it encompasses the acquisition protection, and disposition of property; the role of the accountant in estate planning.
imperfectly competitive markets, employment

ECON 210 and 211 or the equivalent.

Not open to students who have completed

Economics candidates.

1-12 credits. Limited to Ph.D. in business

Accounting

Provides knowledge and skills for advanced

Open only to Ph.D. students in business.

Presents and analyzes contemporary issues in

ACCT 690 Research Seminar in Accounting
Semester course; 3 lecture hours. 3 credits.
Prerequisite: Approval of proposed work is required by the director of graduate programs. Students will work under the supervision of a faculty adviser in planning and carrying out a practical research project. A written report of the investigations is required. To be taken at the end of the program.

Semester course; 1-3 lecture hours. 1, 2 or 3 credits. Study of current topics. Topics may vary from semester to semester.

ACCT 693 Field Project in Accounting
Semester course; 3 lecture hours. 3 credits. Approval of proposed work is required by the director of graduate programs. Graduate students wishing to do research on problems in business administration or business education will submit a detailed outline of their problem. They will be assigned reading and will prepare a written report on the problem. To be taken at the end of the program.

ACCT 697 Guided Study in Accounting
Semester course; 3 lecture hours. 1, 2 or 3 credits. Approval of proposed work is required by the director of graduate programs. Graduate students willing to do research on problems in business administration or business education will submit a detailed outline of their problem. They will be assigned reading and will prepare a written report on the problem. To be taken at the end of the program.

ACCT 698 Dissertation Research in Accounting
Semester course; 1-12 credits. Limited to Ph.D. in business candidates.

Economics

ECON 500 Concepts in Economics
Semester course; 3 lecture hours. 3 credits. Not open to students who have completed ECON 210 and 211 or the equivalent.

Essential economic concepts including the price system, price determination in imperfectly competitive markets, employment

ECON 604 Advanced Microeconomic Theory
Semester course; 3 lecture hours. 3 credits. Prerequisite: Undergraduate course in intermediate microeconomic theory or theory of the firm. Theory of prices and markets; value and distribution. Partial and general equilibrium analysis.

ECON 605 Economic Development
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 500 or equivalent. A study of the location of economic activity, zoning, blight and unemployment, urban renewal, and redevelopment programs.

ECON 607 Advanced Macroeconomic Theory
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 500 or equivalent. An advanced-level examination of why trade occurs, balance of payments adjustment, international equilibrium, forward exchange, markets, international investment, and international organizations.

ECON 609 Advanced International Economics
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 500 or equivalent. An advanced-level examination of why trade occurs, balance of payments adjustment, international equilibrium, forward exchange, markets, international investment, and international organizations.

ECON 610 Managerial Economics
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 500 or equivalent. Analysis of business decisions, applying tools of economic theory. Decisions on demand, production, cost, prices, profits, and investments.

ECON 612 Econometrics
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 403 or equivalent. Analysis of economic data. Topics include: regression analysis, hypothesis testing, confidence intervals, and prediction intervals. Applications to economic, financial, and social science data.

ECON 617 Financial Markets
Semester course; 3 lecture hours. 3 credits. Prerequisites: money and banking, or intermediate macroeconomics. Theories of financial markets for loanable funds and the role of money and credit in economic growth are considered.

ECON 620 The Economics of Industry
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 301, 303, or 610, or the equivalent. The application of economic analysis to the structure, conduct, and performance of industry; public regulation and policies to promote workable competition.

ECON 621 Topics in Economics
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 500 or equivalent and permission of instructor. Study of specialized topic(s) in economics.

ECON 623 Anomalies in Financial Economics
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 617 and ECON 401 or equivalent. Considers anomalies, or evidence that is inconsistent with or difficult to explain using received theory in economics. Studying anomalies is useful both to develop a better, subtler understanding of received theory and to recognize how the theory may be refined or changed to resolve the anomalies. Anomalies considered include the equity premium puzzle, excess-volatility, overreaction and underreaction of asset prices, and asset allocation puzzles. In some cases a proposed anomaly can be explained by more careful treatment of the problem. In other cases, new theories (e.g., noise-trader models) are put forward to explain anomalies.

ECON 624/HADM 624 Health Economics
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 500 or equivalent. Develops a understanding of (1) economics as a managerial tool in making choices or decisions that will provide for an optimum allocation of limited health care resources, and (2) economics as a way of thinking about and approaching issues of public policy in financing and organizing health and medical services. Individual research on crucial or controversial economic issues in the health field.

ECON 631 Labor Market Theory and Analysis
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 600 or one year undergraduate principles of economics. The study of theories and applications designed to analyze wage rate, wage structure, and employment patterns. Studies exploring specific labor markets and problems will be examined.

ECON 641 Econometric Time-series Analysis
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 612. Provides the analytical and programming tools needed to adeptly handle the statistical analyses of econometric time-series data. Topics include: stationarity, unit-roots, univariate time-series models, Vector Autoregressions (VARS), and co-integration. These tools will be used to analyze movements in interest rates, exchange rates and equity markets as well as the transmission of monetary policy actions.
ECON 642 Panel and Nonlinear Methods in Econometrics
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 612. Includes panel data analysis (fixed and random effects); identification and estimation of nonlinear models, limited dependent variable models (probit, logit, tobit, etc.); duration models; and hypothesis/specification tests. The techniques discussed in class will be used to analyze a variety of empirical questions. The course has an applications rather than a theoretical focus.

ECON 682 An Economic Approach to Environmental Issues
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 500 or equivalent. The effect of externalities in terms of efficiency and equity issues is explored. The role and problems of benefit-cost analysis in decision making is developed. The interrelationship of air, water, and land quality issues is analyzed. The use rate of natural resources, energy consumption, and the steady-state economy and their impacts are evaluated.

ECON 690 Research Seminar in Economics
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 604, 607, and 612. Familiarizes students with various research methodologies and research techniques, and provides in an elected field of economics, research experience and a survey of the literature.

ECON 691 Topics in Economics
Semester course; 1-3 lecture hours. 1, 2 or 3 credits. Study of current topics. Topics may vary from semester to semester.

ECON 693 Field Project in Economics
Semester course; 3 lecture hours. 3 credits. Approval of proposed work is required by the director of graduate programs. Students will work under the supervision of a faculty adviser in planning and carrying out a practical research project. A written report of the investigations is required. To be taken at the end of the program.

ECON 697 Guided Study in Economics
Semester course; 3 lecture hours. 2 or 3 credits. Approval of proposed work is required by the director of graduate programs. Graduate students wishing to do research on problems in business administration or business education will submit a detailed outline of their problem. They will be assigned reading and will prepare a written report on the problem. To be taken at the end of the program.

ECON 798-799 Thesis in Economics
Year course; 6 credits. Prerequisite: approval of the proposed work is required by the graduate adviser and the proposed thesis adviser. Graduate students will work under supervision in outlining a graduate thesis and in carrying out the thesis.

Fast Track M.B.A.

FMBA 601-602 Team Building and Leadership
6 credits. Presents how organizations steer members toward what needs doing. Design, functions and creation of teams, engaging leadership and motivation processes to set and achieve organizational goals; management of emerging communication and evaluation processes; interacting with boards and with customers are developed across disciplines.

FMBA 603 Business Foundations
3 credits. Presents how to build a foundation in business quantitative techniques. Concepts of accounting, financial reporting, qualitative finance concepts, control and hypothesis testing are developed and integrated across disciplines.

FMBA 604, 605, 606 Analysis and Decisions
Semester course; 9 credits. Presents how organizations define and choose. Concepts and tools of problem solving for administrative decisions; concepts and tools of measurement, planning, and control; management of conflict, cooperation, negotiation, and implementation are developed and integrated across disciplines.

FMBA 607 Global Challenges
Semester course; 3 credits. Presents an educational tour for direct experience of influences and perspectives: France, Great Britain, Indonesia or Mexico.

FMBA 608 Organizational Culture
3 credits. Presents how organizations develop and operate. Concepts of information technology-adding values, environmental regulations/law, entrepreneurial culture, probability market orientation and management functions are explored.

FMBA 609-610 Productivity and Innovation
6 credits. Presents how organizations change and improve. Management of creativity, critical thinking and rewards; development of resources; implementing concepts of quality, effectiveness and change are developed across disciplines.

FMBA 611-613 Strategic Management
9 credits. Presents how organizations define, plan and accomplish missions. Comprehensive integration of business functions and processes; systems thinking, managing shared expectations and interacting with changing internal and external environments; formulation and implementation of strategy and integrated across disciplines.

Finance, Insurance and Real Estate

FIRE 533 Insurance Education Institute for High School Teachers
3 credits. This is a summer course designed for high school teachers in such fields as business, marketing, economics, mathematics, social sciences, history, life skills, home economics, or other disciplines in which the subject of risk and insurance can be incorporated into the curriculum. Teachers will learn about risk management, life, health, auto, homeowners insurance and financial planning. They will receive instructional materials and guidance to develop lesson plans for their use in teaching the subject to their students.

FIRE 621 Cases in Financial Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 520 or equivalent. Analysis, in a global environment, of financial problems and policies of non-financial firms, including capital management, capital rationing and cost of capital, and capital structure.

FIRE 622 Financial Management of Financial Institutions
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 520 or equivalent. Understanding the application of concepts relevant to the financial management of financial institutions in a global environment.

FIRE 623 Financial Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 520 or equivalent. Analyzes the theory and practice of corporate finance. Detailed investigation of the investment and financing decision of the firm in an environment of uncertainty.

FIRE 625 Group Insurance and Pension Planning
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 520 and MRBL 530 or equivalents. Analysis of major elements of employee benefit plans including: life, health and disability benefits, pension, and profit-sharing plans. Design principles, financing, legal, and tax considerations are examined. Major issues and new developments. Courses are related to risk, insurance and employee benefits are approved for Virginia Insurance Continuing Education. Forty-two credits for insurance agents. Contact the director of insurance studies for further information.

FIRE 626 Risk Management
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 520, MRBL 530, and MGMT 524 or equivalent. Property and liability risks facing businesses and public institutions are studied. Insurance and alternative methods of controlling and financing these risks are analyzed and compared. Course related to risk, insurance and employee benefits are approved for Virginia Insurance Continuing Education. Forty-two credits for insurance agents. Contact the director of insurance studies for further information.

FIRE 627 Real Estate Development
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 520, MRBL 530, and MGMT 524 or equivalent. Property and liability risks facing businesses and public institutions are studied. Insurance and alternative methods of controlling and financing these risks are analyzed and compared. Course related to risk, insurance and employee benefits are approved for Virginia Insurance Continuing Education. Forty-two credits for insurance agents. Contact the director of insurance studies for further information.

FIRE 628 Using GIS in Real Estate Decisions
Semester course; 3 lecture hours. 3 credits. Acquaints students with Geographic Information Systems as a means of selecting and comparatively analyzing prospective sites. Students will use GIS software in making location decisions.

FIRE 629 Real Estate Investment Analysis
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 520 or equivalent. Concepts and tools of analysis, financial statements, net present value, cash flow, and real estate investment analysis.
FIRE 635 Investments and Security Analysis
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 520 and MGMT 524 or equivalent. A study of the principles of investing in stocks and bonds in a global environment, from the analysis of individual securities to portfolio formation and evaluation, using experiential analytic exercises.

FIRE 638 Real Property Investment Law
Semester course; 3 lecture hours. 3 credits. Prerequisite: MRBL 323 or equivalent, or permission of instructor. Covers legal aspects of real property development from acquisition through disposition; emphasizes selection of appropriate ownership form, financing, operation, and tax considerations.

FIRE 639 International Finance
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 520 or equivalent. A study of financial management of multinational enterprises, banks, firms with foreign subsidiaries, exporters, and service industries. Additionally, financing trade and investments, internal and international monies and capital markets, foreign exchange risks, and governmental policies will be covered.

FIRE 650 Derivatives
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 520 or equivalent. Analysis of derivatives contracts: forwards, futures, swaps, options. Study of valuation, pricing and use of derivatives to manage risk in a global environment.

FIRE 654 Short-term Financial Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 520 or equivalent. Techniques of short-term financial management (or working capital management) in a global environment for business firms, including understanding payment systems to achieve efficient cash management of accounts receivable, management of inventory, management of accounts payable, and short-term borrowing from banks and other suppliers of short-term credit.

FIRE 657 Current Issues in Investments and Markets
3 lecture hours. 3 credits. Prerequisite: FIRE 635. Advanced study of selected topics in global investments and securities markets using experiential exercises. Topics selected by the instructor. Readings from recent journals, cases, and/or software may be used. Possible topics may include: fixed income mathematics; portfolio management; advanced investments theory; factors explaining security price movements; advanced security analysis; using information to make investment decisions; and security market microstructure.

FIRE 658 Real Estate Finance and Investments
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 431 or permission of instructor. Emphasizes economic and financial analysis of commercial real estate investments, alternative financing structures and surveys recent trends in the securitization of commercial real estate debt and equity markets.

FIRE 664 Current Issues in Corporate Finance
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 621 or FIRE 623. Advanced study of selected topics in corporate finance and financial management in global entrepreneurial settings. Topics selected by the instructor. Readings from recent journals, cases and/or software may be used. Possible topics include: theory and evidence concerning major corporate financial policy decisions, bankruptcy costs and agency costs that relate to capital structure and dividend policy, issues in corporate control, alternative methods of issuing and retiring securities mergers and acquisitions, advanced valuation theory, advanced financial analysis, advanced capital budgeting, using information to make financial decisions.

FIRE 690 Research Seminar in Finance, Insurance and Real Estate
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by the director of graduate programs. This course is designed to provide research experience for students following the FIRE 789-799 program.

FIRE 691 Topics in Finance, Insurance and Real Estate
Semester course; 1-3 lecture hours. 1, 2 or 3 credits. Study of current topics. Topics may vary from semester to semester.

FIRE 693 Field Project in Finance, Insurance and Real Estate
Semester course; 3 lecture hours. 3 credits. Approval of proposed work is required by the director of graduate programs. Students will work under the supervision of a faculty advisor in planning and carrying out a practical research project using experiential exercises. A written report of the investigations is required. To be taken at the end of the program.

FIRE 697 Guided Study in Finance, Insurance and Real Estate
Semester course; 3 lecture hours. 3 credits. Approval of proposed work is required by the director of graduate programs. Graduate students wishing to do research on problems following the FIRE 798-799 program.

FIRE 758 Theory of Finance
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 520 and MGMT 524 or equivalent. Theoretical underpinnings of finance and financial management in global organizations. Students gain a deeper understanding of concepts and techniques covered in lectures by doing a practical term project that applies one or more of the data mining models and techniques. Students also are given the opportunity to gain knowledge on the features and functionalities of state-of-the-art data mining software through their preparation of a research report.

FIRE 798-799 Thesis in Finance, Insurance and Real Estate
Year course; 6 credits. Graduate students will work under supervisor in outlining a graduate thesis and in carrying out the thesis.

Information Systems

INFO 610 Analysis and Design of Database Systems
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 464 or equivalent. Designed to prepare students for the development of information systems using databases and database management techniques.

INFO 611 Data Re-engineering
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 610 and INFO 630. Covers basic issues in the process of discovering nontrivial, interesting and actionable knowledge from data in databases. The course introduces important concepts, models and techniques of data mining for modern organizations. Students gain a deeper understanding of concepts and techniques covered in lectures by doing a practical term project that applies one or more of the data mining models and techniques. Students also are given the opportunity to gain knowledge on the features and functionalities of state-of-the-art data mining software through their preparation of a research report.

INFO 614 Data Mining
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 464 or INFO 610. A data mining project involves the real-world discovery of nontrivial, interesting and actionable knowledge from data in databases. The course introduces important concepts, models and techniques of data mining for modern organizations. Students gain a deeper understanding of concepts and techniques covered in lectures by doing a practical term project that applies one or more of the data mining models and techniques. Students also are given the opportunity to gain knowledge on the features and functionalities of state-of-the-art data mining software through their preparation of a research report.

INFO 616 Data Warehousing
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 610. Covers important concepts and techniques in the design and implementation of a data warehouse. Topics include: the data warehouse architecture, the logical and physical design issues in the data warehousing development process, technical factors (i.e., hardware, client/server technology, data warehousing and DBMS technologies) and implementation considerations (i.e., data extraction, clean-up and transformation tools). Introduces Online Analytical Processing (OLAP) and Data Mining.

INFO 619 Computer-assisted Simulation
Semester course; 3 lecture hours. 3 credits. Prerequisite: Knowledge of computer programming and MGMT 524 or equivalent. Investigates the concepts and applications of different types of computer simulation modeling approaches. Includes experimental design, systems modeling, programming in a simulation language, and model validation. Emphasis will be on discrete simulation techniques in a business environment.

INFO 620 Data Communications
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 370 or equivalent. Computer network design, communication
INFO 622 Network Administration I
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 620. Studies the TCP/IP protocols and fundamental concepts of Network Operating Systems (NOS). Studies functions and services provided by NOS in addition to TCP/IP architecture and configuration on various NOS. The course also provides practical administrative NOS experience.

INFO 624 Network Administration II
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 620. Covers advanced topics in network administration including disaster recovery, security and cryptography, and implementing advanced services.

INFO 626 Systems Performance Evaluation
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 620 and MGMT 524. Methodology and use of hardware and software tools for the evaluation of computer-based information systems including people and machine productivity.

INFO 628 Database and System Administration
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 620. Exposes students to various system administration issues, especially as those systems exist in Enterprise Resource Planning (ERP) environments. Focuses on administration and system administration. Also covers data security, user administration, data administration, recovery, backup, disaster planning and configuration management. The students will gain hands-on experience in administering databases and ERP systems.

INFO 630 Information Engineering
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 361 and INFO 464. This course covers business process and data modeling for information requirements analysis specification. The process-modeling segment will cover advanced methods and techniques for the analysis and specification of business processes. Techniques for the modeling, analysis and derivation of generic procedures will include procedure mapping and logic normalization. Students will gain hands-on experience with advanced CASE tools.

INFO 632 Business Process Engineering
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 661 or INFO 640 or equivalent. Critically reviews business process (re)engineering methods and practices. The discipline of Business Process and Application Architectures and modularization are examined. Issues in the implementation of application support for business processes are discussed. The discussion includes strategy visioning, performance benchmarking, process modeling and analysis, and planning organizational change. State-of-the-art business engineering tool-sets such as SAP Business Engineer and J.D. Edwards Business Engineering tools are extensively used to provide practical experience.

INFO 634 Application Engineering
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 630 and INFO 632. Covers a model-driven approach to application development and implementation based on business scenarios and business process modeling. This approach allows for the engineering, configuration and integration of business applications from preexisting modules (code and data structures). Students will get hands-on experience with state-of-the-art application configuration tool-sets such as SAP/R3 ABAP Development Workbench and Business Engineer and J.D. Edwards Case Foundation.

INFO 640 Information Systems and Knowledge Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 360 or equivalent. A detailed study of the issues, principles, techniques and best practices in managing information systems and enterprise knowledge as organizational resources. Managing enterprise knowledge and information systems involves taking a disciplined approach to managing the infrastructures and harnessing the collective knowledge capital and power of individuals and organizations. Topics include: IT operations, issues in strategic management, establishing standards and procedures, performance evaluation and benchmarking, hardware and software acquisition, physical environments and security issues, outsourcing and partnerships, personnel, knowledge ontology, meta-knowledge and others.

INFO 642 E-business Intelligence
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 610, INFO 614, INFO 630. Focuses on state-of-the-art business intelligence techniques for supporting the efficient and effective operation of e-business in its interaction with the customers, suppliers and other trading partners.

INFO 653 Decision and Control Systems
Prerequisite: INFO 656 or equivalent. Designed to familiarize students with the state-of-the-art system configurations, including intelligent, real-time, distributed, and command-control systems.

INFO 654 E-business Interface Design
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 640 or INFO 661. Analyzes factors that affect the interaction for e-business systems. Designs and develops systems for the Internet. Requires students to work in teams to produce prototype interactive systems.

INFO 656 Computer-supported Collaborative Systems
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 661 or INFO 640. Investigates how technology is used to support group communication, collaboration and decision making and will be organized around the traditional and innovative ways groups work together to accomplish their tasks. Explores current and future collaborative technologies.

INFO 657 Integrating ERP and E-business Systems
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 610 and INFO 630. Covers the basic principles and techniques of integration between applications in Enterprise Resource Planning environments. Focus is on how e-business applications are configured at the customer-interface and suppliers-enterprise interfaces and infrastructure of a large distribution company.

INFO 658 Electronic Commerce
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 661 or INFO 640. Overviews the emerging field of electronic commerce with emphasis on how information technologies and networks will change the exchange of goods and services in the 21st century. Specific topics include technological infrastructures, types of applications, key policy issues and future trends. Students are evaluated through case study analysis and research, readings, short papers and a class project.

INFO 659 E-commerce Systems Architecture Development
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 620 and INFO 658. Students will create, develop and deploy e-commerce systems, using a three-tier architecture: Web client, Web server and database server. Students will learn how to create effective front-end interfaces for the Web browser as well as product catalogs, shopping carts and database records of customers and their orders for complete e-commerce transactions.

INFO 661 Information Systems for Managers
Semester course; 3 lecture hours. 3 credits. Prerequisites: Completion of all M.B.A. foundation courses or equivalent. This course is restricted to M.B.A. students and must be taken concurrently with MGMT 641. Provides an understanding of the importance and role of information systems in modern business decision making. Emphasizes choices about information technology and managing projects.

INFO 664 Emerging Issues in Information Technology
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 641 and INFO 661. This course is restricted to M.B.A. students and must be taken concurrently with MGMT 675. An investigation of the current and emerging issues in information technology and its role in organizations.

INFO 690 Research Seminar in Information Systems
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by the director of graduate programs. This course is designed to provide research experience for candidates not following the INFO 798-799 program.

INFO 691 Topics in Information Systems
Semester course; 1-3 lecture hours. 1, 2 or 3 credits. Study of current topics. Topics may vary from semester to semester.

INFO 693 Field Project in Information Systems
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by the director of graduate programs. Students will work under the supervision of a faculty adviser in planning and carrying out a practical research project. A written report of the investigations is required. To be taken at the end of the program.

INFO 697 Guided Study in Information Systems
Semester course; 3 lecture hours. 1, 2 or 3 credits. Approval of proposed work is required by the director of graduate programs.
Students are required to read and analyze matter related to any of these topics. The objective of this course is to provide an in-depth analysis of the state of the art in decision support systems, expert systems, and other related topics. The focus will be on the underlying logic, elements, and limits of alternative frameworks such as positivism, empiricism, and Bayesian analysis and the conditions under which each is the preferred method of inquiry.

INFO 710 Database Systems and Data Administration
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 610 or equivalent. Explores advanced concepts related to the management of modern organizations' data resources. Focuses on data administration and the technical aspects of database systems. The objective is to provide an intellectual foundation for students wishing to write a doctoral dissertation on a subject matter related to any of the topics covered. Students are required to read and analyze articles considered fundamental to the current understanding of the topics covered.

INFO 720 Electronic Communication and Telecommunication
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 620 or equivalent. An in-depth analysis of the state of the art in telecommunications and how they are used for networking, collaboration, intra-organizational and the inter-organizational communication. The objective is to provide an intellectual foundation for students wishing to write a doctoral dissertation on a subject matter related to any of the topics covered. Students are required to read and analyze articles considered fundamental to the current understanding of the topics covered.

INFO 730 Seminar on Information Systems Development Methodology
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 630 or equivalent. This doctoral seminar covers the philosophical and theoretical foundations of information systems development methodologies and their development. This seminar reviews the latest developments in this field, commonly known as method engineering. In addition to survey readings, students must accomplish the following: develop an understanding of the evolution of the conceptual structures upon which modern ISDM and CASE tools are based, and develop an ISDM to solve a specific class of problems, and its CASE environment. The primary tool for developing CASE environment is MetaEdit.

INFO 740 Intelligent Systems
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 640 or equivalent. An in-depth analysis of the state of the art in decision support systems, expert systems, executive information systems, agent technology and other related topics. The objective of this course is to provide an intellectual foundation for students wishing to write a doctoral dissertation on a subject matter related to any of the topics covered. Students are required to read and analyze articles considered fundamental to the current understanding of the topics covered.

INFO 750 Human-computer Interaction
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 652 or equivalent. Provides students pursuing the Ph.D. in information systems exposure to current basic and applied research in the field of HCI as it applies to the development, use and deployment of management information systems within an organizational environment. The objective of this course is to provide an intellectual foundation for students wishing to write a doctoral dissertation on a subject matter related to any of the topics covered. Students are required to read and analyze articles considered fundamental to the current understanding of the topics covered.

INFO 760 Group Support Systems/CSCW
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 654 or equivalent. Prepares doctoral students majoring or minoring in information systems to do empirical research on GSS and CSCW. Students are expected to master the literature published in the last two decades in the discipline. The objective of this course is to provide an intellectual foundation for students wishing to write a doctoral dissertation on a subject matter related to any of the topics covered. Students are required to read and analyze articles considered fundamental to the current understanding of the topics covered.

INFO 767 Information Systems Network Design
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 467 or INFO 657. Introduces students to computer communication network design. Wide area, local, and distributed networks are studied together with their interrelationship to business information systems. Case study orientation throughout.

INFO 798-799 Thesis in Information Systems
Year course; 6 credits. Graduate students will work under supervision in outlining a graduate thesis and in carrying out the thesis.

INFO 898 Dissertation Research in Information Systems
1-12 credits. Limited to Ph.D. in business candidates.

Management

MGMT 500 Qualitative Foundation for Decision Making
Semester course; 3 lecture hours. 3 credits. Prerequisite: Basic course in algebra. Students without an adequate background in algebra should take MGMT 171. A review of basic algebra with emphasis on differential and integral calculus and their application in solving business problems. These topics also provide the necessary foundation for using and understanding more advanced quantitative procedures. May not be included in the 30 semester credit hours required for any of the master's degrees offered by the School of Business.

MGMT 524 Statistical Elements of Quantitative Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 523 or equivalent. Develops an ability to interpret and analyze business data in a managerial decision-making context. Managerial applications are stressed in a coverage of descriptive statistics, probability, sampling, estimation, hypothesis testing, and simple regression and correlation analysis. This is a foundation course.

MGMT 540 Management Theory and Practice
Semester course; 3 lecture hours. 3 credits. Theories, principles, and fundamentals applicable to contemporary management thought and productive activities. This is a foundation course.

MGMT 632 Statistical Analysis
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524. Business application-oriented coverage of statistical inference, analysis of variance, multiple regression and correlation, basic forecasting techniques, nonparametric tests, and other related procedures. Use of a computer statistical package will be included for most topics.

MGMT 633 Issues in Labor Relations
Semester course; 3 lecture hours. 3 credits. The conceptual analysis of labor relations; the interconnection between labor-management relations and the sociopolitical environment.

MGMT 634 Collective Bargaining and Labor Arbitration
Semester course; 3 lecture hours. 3 credits. The negotiation and administration of collective bargaining contracts; the handling of grievances.

MGMT 637 Advanced Human Resource Management
Semester course; 3 lecture hours. 3 credits. A critical analysis of the functions and problem areas related to human resource management in a large organization; philosophy of human resource management; employee recruiting, testing, and wage and salary administration; and supplemental compensation systems; manpower, training, and development; employee services; the legal environment of human resource management.

MGMT 641 Organizational Leadership and Project Team Management
Semester course; 3 lecture hours. 3 credits. Prerequisites: Completion of all M.B.A. foundation courses or equivalent, or permission from the Graduate Studies Office. The last two semesters of advanced work in Business Office. This course is restricted to M.B.A. students and must be taken concurrently with INFO 661. An advanced course in management, involving theories and models aimed at developing the managerial competencies needed to analyze, understand, predict and guide individual, group, and organizational behavior.

MGMT 642 Business Policy
Semester course; 3 lecture hours. 3 credits. Prerequisite: Must be taken after completion of all foundation courses plus 15 credits of advanced courses. Integration of principles and policies of business management from the fields of accounting, economics, marketing, finance, statistics, and management in the solution of broad company problems and in the establishment of company policy. Emphasis on interaction of disciplines in efficient administration of a business. Course employs case analysis approach.

MGMT 643 Applied Multivariate Methods
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 632 or equivalent. Study of multivariate statistical methods frequently used in business and administrative problems including principal components, factor
MGMT 644 International Business Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. Business problems in production, inventory, finance, marketing, and transportation translated into mathematical models: strengths and weaknesses of such translation. Solution procedures and their limitations.

MGMT 645 Operations Research
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. Formulation and solution of linear programming problems in production, inventory, finance, marketing, transportation and communication networks. Application to problems in selected countries.

MGMT 646 Managerial Decision Making
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. Business problems in production, inventory, finance, marketing, and transportation translated into mathematical models: strengths and weaknesses of such translation. Solution procedures and their limitations.

MGMT 649 Compensation Policy and Administration
Semester course; 3 lecture hours. 3 credits. Analysis of the concepts and processes involved in compensation systems. Includes evaluation of the internal and external dimensions of compensation, policy issues involved, concepts, and forms of compensation, and compensation of non-wage components. Current and future issues.

MGMT 651 Organizational Communication
Semester course; 3 lecture hours. 3 credits. Study of theoretical constructs of the communication process in organizations. Application of communication principles to management functions, training, telecommunications, and other organizational situations.

MGMT 652 Advanced Business Communication
Semester course; 3 lecture hours. 3 credits. Development of skill in planning and writing business reports and other shorter written communications, conducting business research, delivering oral presentation, and using business communication media.

MGMT 655 Entrepreneurship
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. Individual and corporate entrepreneurship in high and low technology enterprises. Develops an understanding of the role of entrepreneurship theories and practices. Students will develop comprehensive venture analysis plans for presentation.

MGMT 669 Forecasting Methods for Business
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. A presentation of forecasting methods and applications for managerial decision making in business and other organizations. Coverage includes selection of appropriate methods and issues involved in developing and implementing forecasting models. Techniques covered include smoothing, seasonal adjustment, time series (Box-Jenkins) and judgmental methods.

MGMT 674 Cases in Operations Research
Semester course; 3 lecture hours. 3 credits. Prerequisites: ACCT 608, MGMT 645, and completion of foundation courses or equivalent. Integrates and applies prior instruction in operations research. Provides experience in the use of operations research techniques for solving organizational problems through the analysis of cases and management simulations. Use of computer packages will be emphasized.

MGMT 675 Operations Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. Provides a foundation in current concepts of quality management and the tools/techniques used in a quality improvement process. Philosophies of quality management and statistical tools. Case studies and continuous improvement are presented. Applications for manufacturing and service industries included.

MGMT 677 Quality Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. Study of design and development of an effective quality system. Topics include quality systems and practices, quality management, quality management and the tools/techniques used in a quality improvement process. Philosophies of quality management and statistical tools. Case studies and continuous improvement are presented. Applications for manufacturing and service industries included.

MGMT 680 Health, Safety and Security Administration
Semester course; 3 lecture hours. 3 credits. Study of design and development of an effective safety and risk-control program. Topics include organizational needs and assessment, program evaluation, design/implementation of critical procedures, training, accident cost-accounting, cost containment. Also addresses management strategies, communication techniques, motivation and incentive programs and other special topics.

MGMT 682 Human Resource Staffing
Semester course; 3 lecture hours. 3 credits. Addresses the activities and processes that affect the staffing function. Subjects include attracting, selecting, and retaining people who will facilitate the accomplishment of organizational goals. Designed for the future human resource professional who will be involved with designing, administrating, revising, and evaluating selection programs and procedures.

MGMT 684 Issues in International Human Resource Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or permission of instructor. Focuses on issues affecting the application of human resource management practices in an international environment. Examines current challenges in the selection, appraisal, development, compensation, and maintenance of expatriates, repatriates, host country nationals, and third-country nationals. Includes contextual factors of industrial relations systems, legal environment, demographics, and culture.

MGMT 690 Research Seminar in Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by the director of graduate programs. This course is designed to provide research experience for candidates not following the MGMT 798-799 program.

MGMT 691 Topics in Management
Semester course; 1-3 lecture hours. 1, 2 or 3 credits. Study of current topics. Topics may vary from semester to semester.

MGMT 693 Field Project in Management
Semester course; 3 lecture hours. 3 credits. Approval of proposed work is required by the director of graduate programs. Students will work under the supervision of a faculty adviser in planning and carrying out a practical research project. A written report of the investigations is required. To be taken at the end of the program.

MGMT 697 Guided Study in Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: Acceptance in the doctoral program. Study of the scientific method as currently applied in business and organizational research, with emphasis on philosophy, design, execution, and presentation of empirically based knowledge.

MGMT 702/PSYC 702 Causal Analysis for Organizational Studies
Semester course; 3 lecture hours. 3 credits. Prerequisites: MGMT 641 and INFO 661. This course is restricted to M.B.A. students and must be taken concurrently with INFO 664. A systematic investigation of the concepts and issues in designing, operating and controlling productive systems in both manufacturing and services.

MGMT 701 Research Methods in Business
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. Provides a foundation in current concepts of quality management and the tools/techniques used in a quality improvement process. Philosophies of quality management and statistical tools. Case studies and continuous improvement are presented. Applications for manufacturing and service industries included.

MGMT 703 Research Methods for Organizational Studies
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. Provides a foundation in current concepts of quality management and the tools/techniques used in a quality improvement process. Philosophies of quality management and statistical tools. Case studies and continuous improvement are presented. Applications for manufacturing and service industries included.

MGMT 743 Organizing Systems
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 645 or equivalent. Study of the scientific method as currently applied in business and organizational research, with emphasis on philosophy, design, execution, and presentation of empirically based knowledge.

MGMT 744 Organizing Systems
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 645 or equivalent. Study of the scientific method as currently applied in business and organizational research, with emphasis on philosophy, design, execution, and presentation of empirically based knowledge.

MGMT 745 Advanced Operations Research
Semester course; 3 lecture hours. 3 credits. Prerequisites: MGMT 645 or equivalent. Advanced discussion of topics in mathematical programming and network analysis as applied to organizational decision making. Includes network flows, integer, nonlinear, and dynamic programming, and multicriteria optimization. Emphasis on applications and the use of the computer for problem solving.

MGMT 746 Cognitive and Emotional Processes in Organizations
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. This course examines organizational life in terms of
of cognitive and emotional processes at the individual, group, and organizational level. Special attention will be given to how people perceive and evaluate each other.

MGMT 749 History of Management Thought
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 540. Traces the history of management from its beginnings to current approaches and theories.

MGMT 750 Motivational Theories and Applications
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. Critical examination of significant theoretical and applied research on motivational concepts in the organization context.

MGMT 757 Corporate Strategy and Long-range Planning
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 642 or equivalent. Analysis and evaluation of current methods and research in corporate strategy and long-range planning.

MGMT 798-799 Thesis in Management
Year course; 6 credits. Graduate students will work under supervision in outlining a graduate thesis and in carrying out the thesis.

MGMT 898 Dissertation Research in Management
1-12 credits. Limited to Ph.D. in business candidates.

Marketing and Business Law

MRBL 530 Fundamentals of the Legal Environment of Business
Semester course; 3 lecture hours. 3 credits. The legal environment of business is examined in view of common law principles, statutory provisions and administrative regulations affecting various forms of business organizations and management obligations to the company, its owner, and the public. Role of ethics and key commercial law areas are examined including Uniform Commercial Code Provisions.

MRBL 570 Concepts and Issues in Marketing
Semester course; 3 lecture hours. 3 credits. Designed for graduate students with little or no undergraduate education in marketing. A study of the philosophy, environment, and practice of contemporary marketing. This is a foundation course.

MRBL 631 Advanced Labor Law and Legislation
Semester course; 3 lecture hours. 3 credits. Prerequisite: MRBL 427. Advanced labor law and legislation with pertinent causal factors; administrative and judicial determination to date.

MRBL 646 Advanced Labor and Employment Relations Law
Semester course; 3 lecture hours. 3 credits. This course examines the laws concerning human resources in organizations. Equal Employment Opportunity, wage and hours laws, Equal Pay Act, the Employee Retirement Income Security Act, the Occupational Safety and Health Act, and employee personal rights laws are emphasized.

MRBL 651 Direct Marketing Theory and Research
Semester course; 3 lecture hours. 3 credits. Prerequisites: MRBL 570 or equivalent, and permission of instructor or course administrator. Examines the process of building and implementing an effective direct marketing database. Introduces a framework for creative direct marketing strategy development and provides application exercises using both traditional media and the Internet.

MRBL 652 Database and Direct Marketing Strategy
Semester course; 3 lecture hours. 3 credits. Prerequisites: MRBL 570 or equivalent, and permission of instructor or course administrator. Focuses on specialized direct marketing issues, including legal, ethical, global and for-profit. Emphasizes problem solving in the leadership of a direct marketing operation using a "live" case study.

MRBL 656 International Marketing
Semester course; 3 lecture hours. 3 credits. Prerequisite: MRBL 570 or equivalent. Orientation to the international marketplace. Emphasis on international environment, multinational economic blocs, international competition, and development of international marketing strategies.

MRBL 657 International Market Planning Project
Semester course; 3 lecture hours. 3 credits. Prerequisite: MRBL 570 and permission of instructor. This course is a comprehensive real-life, field-based research and strategic planning exercise. A team of graduate business students is matched with a Virginia business that is interested in initiating or expanding export sales. Under the supervision of the instructor, the student team develops an international market plan for the client company. The team functions as an international business consultant to its assigned company.

MRBL 659 Database Marketing
Semester course; 3 lecture hours. 3 credits. Prerequisite: MRBL 570. Provides a theoretical foundation for the study of database marketing, rooted in relationship marketing and improving marketing productivity. Examines the various roles that a database marketing system can play within any business, and offers a framework for determining the database requirements of any organization, including a review of existing database marketing software packages in the marketplace, world examples of database marketing via case studies, client projects, and presentations by practitioners. Includes computer laboratory exercises for students to gain knowledge and experience of analyzing marketing databases for the purpose of determining customer profitability, response to marketing communications, profiling customer segments and improving marketing decision making overall.

MRBL 671 Marketing Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: MRBL 570 or equivalent. Delineation of marketing strategies and implementation of marketing plans and the control and analysis of the total marketing effort.

MRBL 672 Concepts in Consumer Behavior
Semester course; 3 lecture hours. 3 credits. Prerequisite: MRBL 570 or equivalent. A study of the pertinent psychological, sociological, and anthropological variables that influence consumer activity and motivation.

MRBL 673 Marketing Research
Semester course; 3 lecture hours. 3 credits. Prerequisites: MRBL 524 and MRBL 570, or equivalents. A discussion of the techniques of marketing research. Special emphasis will be given to marketing problem definition, determination of information needs, and current methods of analysis of marketing data.

MRBL 674 Service Quality Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: Student in good standing in VCU master's program. This course enables marketing students to develop a principled understanding of service offerings from both a theoretical and practical perspective. Learning will focus on both private and public-sector service organizations. Students will learn how to analyze the design of service offerings, including operations, environment, and people, and make recommendations for improving the offerings. The importance of internal and external customer feedback and continually measuring customer satisfaction/ dissatisfaction will be highlighted as an integral part of managing service quality.

MRBL 690 Research Seminar in Marketing and Business Law
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by the director of graduate programs. This course is designed to provide research experience for candidates not following the MRBL 798-799 program.

MRBL 691 Topics in Marketing and Business Law
Semester course; 1-3 lecture hours. 1, 2 or 3 credits. Study of current topics. Topics may vary from semester to semester.

MRBL 693 Field Project in Marketing and Business Law
Semester course; 3 lecture hours. 3 credits. Approval of proposed work is required by the director of graduate programs. Students will work under the supervision of a faculty adviser in planning and carrying out a practical research project. A written report of the investigations is required. To be taken at the end of the program.

MRBL 697 Guided Study in Marketing and Business Law
Semester course; 3 lecture hours. 1, 2 or 3 credits. Approval of proposed work is required by the director of graduate programs. Graduate students wishing to do research on problems in business administration or business education will submit a detailed
outline of their problem. They will be assigned reading and will prepare a written report on the problem. To be taken at the end of the program.

**MRBL 798-799 Thesis in Marketing and Business Law**

Year course; 6 credits. Graduate students will work under supervision in outlining a graduate thesis and in carrying out the thesis.
School of Dentistry

Dental Special Topics

DENS 502 Computer Applications in Dentistry
Semester course; 16 seminar hours. 1 credit. Provides the graduate student with information on how to use technology to locate, evaluate and collect information from a variety of scientific sources. In addition, students will learn how to use technology tools to process data and report results.

DENS 550 Update in Practice Administration
Semester course; 15 seminar hours. 1 credit. Lectures and seminar discussion on the business aspects of contemporary specialty dental practice, with emphasis on entry into practice, associateship contracts, financing arrangements, risk management and employee relations.

DENS 580 Biostatistics and Research Design in Dentistry
Semester course; 30 seminar hours. 2 credits. Must be taken for two consecutive semesters. Provides the advanced education student in dentistry an appreciation for the need for and uses of fundamental biostatistical methods in dental applications. Appropriate research designs for answering research questions of importance in dentistry will be examined. An array of biostatistical methods that are commonly used in the dental literature and by agencies such as the FDA to evaluate new dental products and methodologies are discussed.

DENS 660 Interdisciplinary Care Conference
Semester course; 7 hours. 0.5 credit. Must be taken every semester of the program. Provides a forum for formal presentation and group discussion of the diagnosis, treatment planning, delivery and prognosis of interdisciplinary dental care.

DENS 700 Basic Sciences and Graduate Dentistry
First year; spring course; 45 hours. 3 credits. Advanced level topics related to the principles and practices of dentistry including: oral pathology, biochemistry and physiology, infection and immunity, pharmacology, biomaterials and genetics.

Endodontics

ENDO 522 Introduction: Specialty of Endodontics
Semester course; 80 laboratory hours. 2.5 credits. Restricted to first-year students. Utilizes laboratory exercises to review basic concepts and introduce the more complex technical procedures required to practice the clinical specialty of endodontics.

ENDO 530 Advanced Oral Pathology
Semester course; 13 seminar hours. 1 credit. Provides through a series of seminars, an in-depth knowledge of those specific areas of oral pathology that apply to endodontics.

ENDO 532 Management of Medical Emergencies in the Dental Office
Semester course; 20 seminar hours. 1 credit. Provides through a series of seminars, an in-depth level of knowledge in the management of medical emergencies in the dental office.

ENDO 560 Endodontic Therapy Lectures
Semester course; 36 lecture hours. 2 credits. Restricted to first-year students. Presents a series of lectures on clinical endodontic topics in order to familiarize the students with clinical endodontic procedures either in conjunction with or prior to the "Endodontic Topic Literature Reviews" on these specific clinical topics.

ENDO 650 Endodontic Topic Literature Review
Semester course; 36 seminar hours. 2 credits. Must be taken every semester of the program. Reviews topic literature pertaining to the scientific basis for endodontic procedures and the materials and techniques utilized in the clinical practice of endodontics. Discusses content of the reviewed literature and critically evaluates by means of abstracts and study questions.

ENDO 652 Endodontic Clinical Seminars
Semester course; 28 seminar hours. 2 credits. Must be taken every semester of the program. Requires students to present a seminar once each month in which difficult diagnostic cases, patient management problems and complex treatment cases are critiqued and treatment options discussed.

ENDO 654 Endodontic Management of the Medically Compromised Patient
Semester course; 14 seminar hours. 1 credit. Must be taken for two consecutive semesters. Provides students, through a seminar series, with an in-depth level of knowledge in the endodontic management of the medically compromised patient.

ENDO 656 Endodontic Current Literature Review
Semester course; 18 seminar hours. 1 credit. Must be taken every semester of the program. Provides a review of current journal literature that pertains to the scientific basis for endodontic procedures, materials and techniques currently being used in the clinical practice of endodontics. Discusses and critically evaluates the content of the reviewed literature. Requires written abstracts of all reviewed articles.

ENDO 670 Master's Thesis: Endodontics
Semester course; 36 seminar hours. 2 credits. Must be taken every semester of the program. The graduate student selects a research project topic, conducts the necessary background literature review, develops a protocol, obtains the necessary materials, instruments and human/animal use approvals as necessary, collects and analyzes the data, presents findings in the form of a master's thesis and prepares a manuscript for publication.

ENDO 680 Clinical Endodontics
Semester course; 153 clinical sessions. 5 credits. Must be taken every semester of the program. Permits students to receive supervised training in every type of clinical endodontic procedure. Provides students with experience in the management and treatment of cases which are the same types of complex non-surgical and surgical cases treated in a specialty practice of endodontics.

Orthodontics

ORTH 516 Introduction to Orthodontics for Non-orthodontic Postdoctoral Students
Semester course; 30 lecture/seminar hours. 2 credits. Introduces the basis for orthodontic treatment for non-orthodontic graduate students in dentistry. Discusses growth and development and the basis for orthodontic therapy.

ORTH 532 Biomechanics: Theoretical Basis for Tooth Movement
Semester course; 15 lecture/seminar hours. 1 credit. Introduces physical science of biomechanics and engineering concepts applied to orthodontic force systems. Emphasizes equilibrium and the biological manifestation of force systems applied to the dentition and craniofacial skeleton.

ORTH 620 Orthodontic Clinic for Non-Orthodontic Graduate Students
Semester course; 30 clinical sessions. 1 credit. Must be taken every semester of the program. Allows residents to diagnose and treat limited orthodontic problems with special emphasis on the primary and mixed dentitions. Includes, but is not limited to, anterior and posterior crossbites, space and tooth loss, transposition, definitive crowding and tooth irregularities, oral habits, ectopic and other tooth eruption problems.

ORTH 630 Orthodontic-Periodontic Conference
Semester course; 7.5 seminar hours. 0.5 credit. Must be taken every semester of the program. Discusses treatment planning and analysis of patients requiring combined orthodontic and periodontic care. Presents topics of interest to orthodontists and periodontists.

ORTH 640 Orthodontic-AEGD Conference
Semester course; 7.5 seminar hours. 0.5 credit. Must be taken every semester of the program. Provides treatment planning and analysis of patients requiring combined orthodontic and restorative care. Encourages discussion of topics of interest to orthodontists and advanced general dentists.

ORTH 650 Literature Review
Semester course; 30 seminar hours. 2 credits. Must be taken every semester of the program. Reviews classical articles in areas of special orthodontic interest. Establishes the state-of-the-art and existing information base. Gives special attention to research methodology and conclusions reached.

ORTH 652 Growth and Development
Semester course; 30 lecture/seminar hours. 2 credits. Must be taken every semester of the program. Reviews classical articles in areas of special orthodontic interest. Establishes the state-of-the-art and existing information base. Gives special attention to research methodology and conclusions reached.

ORTH 654 Orthodontic Diagnosis and Treatment Planning
Semester course; 30 seminar hours. 2 credits. Must be taken every semester of the program. Considers and discusses available and contemporary diagnostic and therapeutic approaches.
theoretical options for clinical management of variations in facial form and dental occlusion.

**ORTH 656 Current Literature**
Semester course; 30 seminar hours. 2 credits. Must be taken every semester of the program. Presents in a journal-club format evaluation of current information in orthodontics and related disciplines. Includes special emphasis on research methodology and the contributions of current research to advances in orthodontics.

**ORTH 658 Analysis of Orthodontic Treatment**
Semester course; 22.5 seminar hours. 1.5 credits. Must be taken every semester of the program. Analyzes cephalometric and other objective measures of the outcomes of orthodontic therapy. Reviews treatment objectives with respect to actual changes elected in patients. Delineates changes resulting from the non-normal variations in craniofacial development.

**ORTH 660 Orthognathic Conference**
Semester course; 15 seminar hours. 1 credit. Must be taken every semester of the program. Presents patients requiring coordinated orthodontic and oral surgery care. Emphasizes long- and short-term biologic stability of alterations in the structure and function of the craniofacial skeleton with increased emphasis on facial form and dental occlusion.

**ORTH 662 Craniofacial Anomalies**
Semester course; 15 lecture/seminar hours. 1 credit. Must be taken every semester of the program. Discusses the etiology and embryologic basis of congenital and acquired deformities in the craniofacial structures. Emphasizes syndromes with craniofacial manifestations and the diagnosis and treatment planning for patients with facial clefts.

**ORTH 664 Orthodontic Interactions with Generalist and Specialties**
Semester course; 30 clinic/lecture/seminar hours. 2 credits. Must be taken every semester of the program. Provides supervised clinical experiences in treatment planning and treatment with general dental students and patients appropriate for general dental practice.

**ORTH 670 Master’s Thesis: Orthodontics**
Semester course; 36 seminar hours. 2 credits. Must be taken every semester of the program. Provides for the clinical diagnosis and treatment planning of the child, adolescent and special patient. Discusses the techniques employed in the management of orofacial trauma, dental pain and infections.

**ORTH 680 Pediatric Dentistry**
Semester course; 15 lecture/seminar hours. 1 credit. Increases the awareness of the risk factors that may lead to using life support measures in the infant, child and adolescent. Stresses early warning signs and what to do in a cardiopulmonary emergency. Requires students to know how to start an IV, perform endotracheal intubation, know essential and useful drugs, recognize ventricular fibrillation, defibrillation and dysrhythmias from the electrocardiogram and paper recordings as well as drug therapy for dysrhythmias.

**PEDD 511 General Anesthesia Rotation**
Semester course; 40 clinical sessions. 1.5 credits. Teaches general anesthesia with special emphasis in pediatrics. Allows students to become knowledgeable in pre-operative evaluation, risk assessment, assessing the effects of pharmacologic agents, venipuncture techniques, general anesthetic induction and intubation, administration of anesthetic agents, patient monitoring, prevention and management of anesthesia emergencies, recovery room management, postoperative appraisal and follow-up.

**PEDD 514 Introduction to Pediatric Dentistry**
Semester course; 30 lecture hours. 2 credits. Introduces material in pediatric dentistry. Involves didactic, clinical and laboratory portions.

**PEDD 572 Pediatric Dental Emergency Service**
Semester course; 30 clinical sessions. 1 credit. Must be taken for two consecutive semesters. Courses are scheduled for emergency services on a weekly basis. Offers experience in the assessment and management of orofacial trauma, dental pain and infections.

**PEDD 600 Oral Pathology Rotation**
Semester course; 24 clinical sessions. 0.5 credit. Reviews approximately 250 slides of biopsy material daily for 10 days, which includes access to a consultation file containing 1,500 cases. Encourages students to participate in numerous clinical consultations within the School of Dentistry and to learn how to do biopsies.

**PEDD 612 Seminar Series: Pediatric Dentistry and Medicine**
Semester course; 30 lecture/seminar hours. 2 credits. Must be taken every semester of the program. Provides an arena for students to present seminars in either a clinical area or medical conditions of interest to pediatric dentists. Gives students practical experience in giving formal presentations and provides them with information related to clinical subject area(s) with medical conditions about which pediatric dentists should be knowledgeable.

**PEDD 620 Pediatric Medicine Rotation**
Semester course; 40 clinical sessions. 1.5 credits. Requires students to obtain and evaluate medical histories, parental interviews, system-oriented physical examinations, clinical assessments of healthy and ill patients, selection of laboratory tests and evaluation of diagnosis, evaluation of physical, motor and sensory development, genetic implications of childhood diseases, the use of drug therapy in the management of diseases and pain, and treatment planning through discussions and explanations.

**Pediatric Dentistry**

**PEDD 510 Pediatric Advanced Life Support**
Semester course; 15 lecture/seminar hours. 1 credit. Provides students with experience in drug therapy for dysrhythmias.

**PEDD 640 Clinical Teaching**
Semester course; 30 clinical sessions. 1 credit. Must be taken every semester of the program. Lectures and clinical instruction involving contact with third- and fourth-year dental students. Provides teaching experience in diagnosis and treatment planning, restorative preparations and management of children’s behavior.

**PEDD 650 Literature Review**
Semester course; 30 lecture/seminar hours. 2 credits. Must be taken every semester of the program. Reviews literature related to all aspects of the pediatric patient. Emphasizes the ability students to discuss the content of the articles and to critically evaluate it. Stresses the integration of new material with previously discussed literature and collateral material. Uses the reading list from the American Board of Pediatric Dentistry.

**PEDD 654 Treatment Planning Seminar**
Semester course; 30 lecture/seminar hours. 2 credits. Must be taken every semester of the program. Provides diagnosis and treatment planning of the child, adolescent and special patient. Follows up on records on completed cases, which also are presented and evaluated. Discusses the techniques employed and the justification of the treatment.

**PEDD 656 Current Literature Review**
Semester course; 6 lecture/seminar hours. 0.5 credit. Must be taken every semester of the program. Discusses articles from recent publications relating to all aspects of pediatric dentistry. Requires students to review “Practical Reviews in Pediatric Dentistry,” a continuing education program sponsored by the American Academy of Pediatric Dentistry. Includes a review of cassettes on current pediatric dentistry by students every other month.

**PEDD 670 Master’s Thesis: Pediatric Dentistry**
Semester course; 36 seminar hours. 2 credits. Must be taken every semester of the program. Provides for the clinical diagnosis and treatment planning of the child, adolescent and special patient. Discusses the techniques employed in the management of orofacial trauma, dental pain and infections.

**PEDD 680 Pediatric Dental Clinic**
Semester course; 120 clinical sessions. 4 credits. Must be taken every semester of the program. Provides for the clinical management of pediatric dental patients. Provides experiences in the treatment of infants, preschool children, adolescent and special patients. Stresses pharmacological and non-pharmacological techniques and behavior management.

**Periodontics**

**PERI 508 Physical Diagnosis**
Semester course; 30 lecture hours. 2 credits. Provides lectures and hands on experience in physical diagnosis, history taking, general physical examination and review of major organ systems.

**PERI 511 Anesthesiology Rotation**
Semester course; 45 clinical sessions. 1.5 credits. Provides students with experience in treatment planning of the child, adolescent and special patient. Discusses the techniques employed in the management of orofacial trauma, dental pain and infections.
general anesthesia under the direction of the dental anesthesiologist. Emphasizes operating room procedures, airway management, intravenous techniques, anesthetics and resuscitative procedures. Includes clinical management of conscious sedation cases.

**PERI 512 Conscious Sedation**
Semester course; 30 lecture/seminar hours. 2 credits. Reviews concepts of parental consent/transportation techniques to include anatomy and physiology of the respiratory, cardiovascular and central nervous system, drug pharmacology, intravenous technique, prevention, recognition and management of complications, management of emergencies, physiologic monitoring and equipment, basic life support and advanced cardiac life support.

**PERI 514 Introduction to Periodontics**
Semester course; 90 lecture/seminar hours. 3 credits. Provides students with an introductory course in the clinical practice of periodontics. Emphasizes diagnosis, etiology, pathogenesis, treatment planning, initial therapy, therapeutic approaches, suturing techniques, oral hygiene, history and prophylaxis.

**PERI 515 Internal Medicine Rotation**
Semester course; 45 clinic sessions: 1.5 credits. Provides students with experience in internal medicine under the direct supervision of the Department of Internal Medicine. Emphasizes hospital procedures and management of the medically-compromised patient.

**PERI 520 Principles of Periodontics**
Semester course; 30 lecture/seminar hours. 2 credits. Must be taken for two consecutive semesters. Reviews the principles of the basic sciences of periodontology, including anatomy, diagnosis, scaling and root planning, and treatment planning. Reviews the indications and contraindications for management of complex periodontal problems. Reviews the principles of non-surgical and surgical techniques.

**PERI 522 Implantology**
Semester course; 16 lecture/seminar hours. 1 credit. Covers: a historical review of dental implants, including biologic principles, techniques and systems; diagnosis, interdisciplinary considerations, treatment planning and indications and contraindications for implants; wound healing for implants, including osseointegration, surgical techniques and implant maintenance. Provides a hands-on technique laboratory.

**PERI 619 Clinical Pathology Rotation**
Semester course; 21 clinic sessions. 0.5 credit. Provides instruction in patient assessment, biopsy technique, assessment of tissue preparations and review of oral histologic slide materials.

**PERI 630 Medicine: Oral Medicine Seminar**
Semester course; 26 seminar hours. 1 credit. Must be taken every semester of the program. Emphasizes diagnosis, pathogenesis, oral manifestations and management of systemic diseases. Reviews the management of the medically-compromised patient, including laboratory procedures, pharmacology, hematology and radiology of the cardiovascular, respiratory, renal and neurologic systems. Discusses and critically evaluates medical and oral medicine topics relative to management of the periodontal patient.

**PERI 650 Periodontal Literature Review**
Semester course; 48 seminar hours. 3 credits. Must be taken every semester of the program. Reviews the periodontal literature from articles to recent publications pertaining to the scientific basis for periodontal procedures. Reviews the concepts of diagnosis, etiology, epidemiology, pathogenesis, treatment planning and maintenance of periodontal diseases and implantology. Discusses content of the literature by means of abstracts and study questions.

**PERI 654 Treatment Plan: Case Presentations**
Semester course; 12 seminar hours. 1 credit. Must be taken every semester of the program. Emphasizes the interpretation of the medical and dental histories, radiographic and clinical findings, diagnosis, etiology, prognosis, treatment planning, therapy and supportive periodontal care. Discusses the content of reviewed cases by written and oral presentations. Requires the student to assimilate and interpret clinical findings.

**PERI 656 Current Literature Review**
Semester course; 36 seminar hours. 2 credits. Must be taken every semester of the program. Provides an in-depth review of contemporary periodontal literature. Discusses content of the reviewed literature by means of abstracts and discussion.

**PERI 670 Master’s Thesis: Periodontics**
Semester course; 25 seminar hours. 1.5 credits. Must be taken every semester of the program. The graduate student selects a research project subject, conducts literature review, develops a protocol, obtains the necessary materials, and presents the findings in the form of a master’s thesis. Requires the student to assimilate and interpret clinical findings.

**PERI 680 Clinical Periodontics**
Semester course; 160 clinic sessions. 5 credits. Must be taken every semester of the program. Provides supervised training in periodontics. Provides the student with an experience in the treatment and management of patients with gingivitis and severe periodontal diseases. Emphasizes diagnosis, treatment planning, prognosis, scaling and root planning, non-surgical and surgical surgical techniques. Provides experience in the treatment of advanced periodontal cases and more complex surgical techniques including preprosthetic, orthodontic, periodontal plastic and mucogingival procedures, guided tissue regeneration, guided bone regeneration and implant surgical techniques.

**PERI 719 Specialty Practice Management**
Semester course; 22 seminar hours. 0.5 credit. Must be taken for two consecutive semesters. Provides students with experience in office management. Requires visits to specialty offices to familiarize the student with contemporary management of practice administration and patient management.

**Prosthodontics**

**PROS 560 Basic Prosthodontics**
Semester course; 50 lecture/seminar hours; 170 laboratory hours. 9 credits. Must be taken first year of the program. Provides students with an introductory review of the principles, philosophy and practices of prosthodontics. Includes subject areas of fixed, removable and implant prosthodontics, dental materials, occlusion, etc. Consists of lecture, seminar and practical and laboratory exercises. Presents dental laboratory procedures that are followed with students demonstrating the technical process to a proficiency level.

**PROS 580 Clinical Prosthodontics**
Semester course; 45 lecture/seminar hours. 5 credits. Must be taken first year of the program. Prepares students to evaluate, plan and treat a wide range of patients requiring advanced prosthodontic care. Utilizes a variety of dental implant systems, articulation and treatment philosophies. Includes numerical guidelines that provide direction for the type of prosthodontic treatment required. Designs clinical prosthodontist to prepare the advanced education student to move into specialty practice with the necessary knowledge and experience.
Administration and Supervision

ADMS 600 Public School Administration
Semester course; 3 lecture hours. 3 credits. An overview of the theory and practice of public school administration. Emphasis will be placed on the governance of education and leadership roles of school boards, superintendents, principals and supervisors at the elementary and secondary levels. Appropriate field-based experiences relating theory to practice.

ADMS 601 Processes of Instructional Leadership
Semester course; 3 lecture hours. 3 credits. An examination of clinical supervision methods for use by principals and supervisors to facilitate instructional improvement in schools. Emphasis on collection and interpretation of observation and interview data for analysis of teaching problems and development of improvement strategies consistent with current research.

ADMS 602 Seminar in Elementary School Administration
Semester course; 3 lecture hours. 3 credits. Problems and issues in elementary school leadership. Major responsibilities of the elementary school principal. Enrollment limited to specialists in administration.

ADMS 603 Seminar in Secondary School Administration
Semester course; 3 lecture hours. 3 credits. Problems and issues in secondary school leadership. Major responsibilities of the secondary school principal. Enrollment limited to specialists in administration.

ADMS 604 Principalship Seminar
Semester course; 3 lecture hours. 3 credits. Problems and issues in school administration, K-12. A culminating experience designed to provide school administrators with essential understandings, knowledge and skills necessary to maintain and renew a school. Particular emphasis will be placed on planning, vision setting, student and staff affairs, curriculum and instruction and resource allocation.

ADMS 605 Organizational Theory, Structure and Culture in Educational Settings
Semester course; 3 lecture hours. 3 credits. A study of organizational theory, structure, and culture relating to schools. Emphasis on conceptual understandings needed for practical implementation.

ADMS 606 Organizational Behavior and Change in Educational Settings
Semester course; 3 lecture hours. 3 credits. A study of organizational concepts and practices in educational contexts. Emphasis on both conceptual understandings and specific professional skills relating to diagnosis and development.

ADMS 607 Principles of Educational Leadership
Semester course; 3 lecture hours. 3 credits. Develops understanding of school leadership of effective leadership in organizations, personal leadership styles, and modifying leadership styles. Leadership with respect to vision building, organizational communications, motivating others, and group problem solving will serve as major areas of study. Lecture, individual study, group work and fieldwork will serve as major means of course delivery.

ADMS 610 School and Community Relations
Semester course; 3 lecture hours. 3 credits. New concepts and specific techniques in school-community relations for teachers, involvement in educational planning, involvement in community planning and an examination of evaluative projects for community use. Appropriate field-based experiences relating theory to practice will be included.

ADMS 611 School Law
Semester course; 3 lecture hours. 3 credits. Legal aspects of school administration that include constitutional and statutory provisions and court decisions.

ADMS 620 Improving School Programs and Performance
Semester course; 3 lecture hours. 3 credits. Introduction to principles of administering outcome-based instructional improvement strategies in schools. Applies testing and evaluation techniques to the problem of improving instructional programs, with an emphasis on identification, selection and measurement of appropriate performance indicators.

ADMS 621 Management of School Operations and Support Programs
Semester course; 3 lecture hours. 3 credits. Developing understanding and practices of the school principal's role with respect to key elements of managing school operations and support programs. Special attention will be given to goal setting for programs, securing, organizing and managing human, material and financial resources. Attention will be given to cost/time-effective practices and accountability.

ADMS 632 Administration and Supervision of Special Education
Semester course; 3 lecture hours. 3 credits. Examines practices and problems in providing school programs for individuals with disabilities and gifted students.

ADMS 640 Public School Finance
Semester course; 3 lecture hours. 3 credits. A study of theories, policies, and expenditures of school funds. Special attention will be given to the practice of educational finance within the public school structure. The course will include such topics as the school budget, financial accounting, purchasing and supply problems, school equipment and school insurance.

ADMS 641 School Personnel Administration
Semester course; 3 lecture hours. 3 credits. A study of the personnel function in educational organizations. Designed to explore techniques and problems of staff-personnel relationships in contemporary education.

ADMS 643 The Community School
Semester course; 3 lecture hours. 3 credits. The development and utilization of the community school concept will be examined. Community-wide use of school facilities and the involvement of the total community in the learning process will be studied.

Emphasis will be placed on the physical plant design, organizational structure, staffing and curriculum of the community school. The utilization of the community school to implement “lifelong learning” will be stressed.

ADMS 672 Internship
Semester course; 1-6 credits. May be repeated for a maximum of 12 credits. Prerequisite: Permission of adviser. Study and integration of theory with practice in clinical or off-campus settings supervised by an approved professional and university faculty. May include seminars, selected readings, projects and other activities designed and evaluated by supervising faculty.

ADMS 700 Externship
Semester course; 1-6 credits. May be repeated for a maximum of 9 credits. Prerequisite: Permission of department. Plan of work designed by extern with prior approval of the offering department. State certification or equivalent may be required for some externships. Off-campus planned experiences for advanced graduate students designed to extend professional competencies, carried out in a setting, under supervision of an approved professional. Externship activities monitored and evaluated by university faculty.

ADMS 701 Development and Implementation of Administrative Policies in Education
Semester course; 3 lecture hours. 3 credits. Examines processes involved in developing and implementing educational policy from the perspective of the school administrator. Emphasis is given to the roles of federal, state and local governments in policy-making with attention to problems encountered in implementing educational policies.

ADMS 702 Educational Administration: Contemporary Theory and Practice
Semester course; 3 lecture hours. 3 credits. Prerequisite: ADMS 600 or equivalent. Study of recent developments in administrative theory and the application of these theories to contemporary and future educational issues and problems.

ADMS 703 Supervision of Special Education
Semester course; 3 lecture hours. 3 credits. Study of theories, principles, and procedures of supervision of special education. Study of recent developments in administrative theory and the application of these theories to contemporary and future educational issues and problems.

ADMS 704 School Business Administration
Semester course; 3 lecture hours. 3 credits. Study of theories, principles and practices of school business administration as they apply to the school district. Study of the theory, principles, criteria, procedures and practices of planning educational facilities and the modernization, maintenance and operation of existing facilities.

ADMS 706 Advanced Supervision of Instruction
Semester course; 3 lecture hours. 3 credits. Prerequisite: ADMS 601 or equivalent. Examines the development of the curriculum and management of instruction in schools; particular attention to organizational processes in schools and their relationship to instruction.
ADMS 707 Advanced Educational Law  
Semester course; 3 lecture hours. 3 credits.  
Prerequisite: ADMS 611 or equivalent.  
Study of the legal aspects of curricular decision-making, ethical precepts and liabilities of school officials; and the legal responsibilities, rights, and liabilities of school personnel, school students and parents of students.

Adult Education

ADLT 600 Adult Education Perspective  
Semester course; 3 lecture hours. 3 credits.  
Provides a basic perspective on adult education. Presents a survey of the philosophical underpinnings of the field, including schools of thought and associated theorists, roles and functions of adult educators, agencies and organizations that sponsor/provide adult learning, etc. Emphasis will be placed on the research underlying theories upon which such systems are based, and critical analysis of the current technologically mediated learning systems used in corporate, private, public, military and post-secondary educational environments. Critiques the underlying philosophical and psychological theories upon which such systems are based. Examines these mediated delivery systems in light of contemporary adult learning theories and four adult education/HRD perspectives: Technology as Curriculum, Technology as a Delivery Medium, Technology as a Complement to Instruction and Technology as an Instructional Tool. Identifies future trends and issues in adult mediated learning systems.

ADLT 620 Human Resource Development Overview  
Semester course; 3 lecture hours. 3 credits.  
Provides an overview of the HRD field, to include theories, practices and emerging concepts. Emphasis is on roles, functions and responsibilities of the HRD practitioner in supporting the strategies, mission and goals of the enterprise, whether public, private or nonprofit.

ADLT 621 Skills Development for Human Resource Development  
Semester course; 3 lecture hours. 3 credits.  
Develops skills and understandings critical to success as an HRD practitioner. Exposes students to techniques of instruction and survey instruments to gauge organizational climate and learning style differences. Emphasizes practical experience and issue analysis in gaining HRD skills that can be immediately employed.

ADLT 622 Human Resource Development Strategies and Interventions  
Semester course; 3 lecture hours. 3 credits.  
Examines organizational development, nature of interventions, when to use them (and not use them), and a variety of models for aligning human resources capabilities with organizational needs. Focuses on introduction of change and transformation of organizational culture.

ADLT 631/EDUS 631 American College and University  
3 credits.  
Examines historical and contemporary foundations of American higher education through the study of leading developments and of contemporary issues relating to the curriculum, aims and objectives and current directions of American colleges, universities and other institutional settings of higher education.

ADLT 632/EDUS 632 The Changing Face of Higher Education  
3 credits.  
Examines how higher education is changing and explores the reasons for these changes, including how the academy is responding to social pressures and explores scenarios for future change.

ADLT 633/EDUS 633 Academic Leadership in Higher Education  
3 credits.  
Analyzes how leadership in higher education is similar to and different from leadership in other organizational settings, explores challenges for leadership (such as access, cost and social responsiveness) and examines emerging leadership roles at various levels of the academic organization.

ADLT 700 Technologically Mediated Adult Learning Systems  
Semester course; 3 lecture hours. 3 credits.  
A survey of the current technologically mediated adult learning systems used in corporate, private, public, military and post-secondary educational environments. Critiques the underlying philosophical and psychological theories upon which such systems are based. Examines these mediated delivery systems in light of contemporary adult learning theories and four adult education/HRD perspectives: Technology as Curriculum, Technology as a Delivery Medium, Technology as a Complement to Instruction and Technology as an Instructional Tool. Identifies future trends and issues in adult mediated learning systems.

ADLT 701 Advanced Program Planning in Adult Education and Human Resource Development  
Semester course; 3 lecture hours. 3 credits.  
Prerequisite: ADLT 620 Adult Program Planning, Management and Evaluation or permission of the instructor. Analyzes current approaches to program planning in adult education and human resource development. Explores specific aspects of program planning, including needs analysis, managing large-scale program operations and interorganizational relationships.

ADLT 702 Seminar in Adult Learning Theories  
Semester course; 3 lecture hours. 3 credits.  
Provides an opportunity to examine adult learning theories from a variety of epistemologies. Course is cross-disciplinary in scope, capitalizes on a wide research base, and features interaction between students and lead theorists.

ADLT 703 The Adult Education and Human Resource Development Consultant  
Semester course; 3 lecture hours. 3 credits.  
Appropriate prerequisites required or permission of the instructor. Emphasizes the roles, responsibilities and skills of internal and external consultants working with adult education and/or human resource development organizations. Analyzes change, intervention and stabilization processes, the roles and functions of consultants, phases of the consulting process, adoption and diffusion of consultant innovations and diagnostic skills of consultants. Critiques current consultant intervention models and strategies.

ADLT 704 Groups, Teams and Organizational Learning  
Semester course; 3 lecture hours. 3 credits.  
A critical analysis and evaluation of how human resource development draws on group dynamics, team relatedness, cohesiveness and organizational learning to create learning environments, analyze problems, build organizational capabilities and refine group processes.

ADLT 705 Global Human Resource Development  
Semester course; 3 lecture hours. 3 credits.  
Provides an in-depth awareness of how HRD practices must be modified when dealing with a global workforce. Probes a variety of multicultural dimensions in elevating cultural awareness and sensitivity. Emphasizes building effective HRD programs in cross-cultural contexts.

Counselor Education

CLED 600 Introduction to Guidance  
Semester course; 3 lecture hours. 3 credits.  
An introductory course for all students in counselor education. The course is designed for both elementary and secondary counselors and is a prerequisite to all other courses offered by the department of counselor education. It includes a survey of pupil personnel services and places special emphasis on those services associated with the guidance program.

CLED 601 Theories of Counseling  
Semester course; 3 lecture hours. 3 credits.  
The theories upon which counseling is based will be presented, with particular attention placed on the research underlying...
the theories. The primary focus will be on providing students with a theoretical foundation upon which to base their counseling techniques.

**CLED 602 Practicum: Techniques of Counseling**
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLED 600 and CLED 601 or permission of instructor. A study and applications of a variety of counseling techniques employed in the counseling relationship. Emphasis will be placed on counseling skill development.

**CLED 603 Group Procedures in Counseling**
Semester course; 3 lecture hours. 3 credits. Introduction to the group process, group counseling and group guidance contrasted and defined; basically theoretical.

**CLED 604 Practicum: Group Procedures in Counseling**
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLED 601 and CLED 603. Utilization of small-group interaction as a vehicle to explore techniques and procedures common to human relations study. Focus on the teaching of interpersonal effectiveness, behavior objective identification, and developing of experiences relevant to leadership, communication skills, decision making and development in affective or humanistic education.

**CLED 605 Career Information and Exploration**
Semester course; 3 lecture hours. 3 credits. Designed to provide the potential counselor with an understanding of theoretical approaches to career development at the K-adult level. Emphasis will be given to the relationship between counselor and student(s) in the career exploration and decision making process. A review of occupational, educational and personal/social information resources will be made.

**CLED 606 Assessment Techniques for Counselors**
Semester course; 3 lecture hours. 3 credits. An examination of individual and group tests will be made. Particular attention will be given to tests of intelligence, aptitude, achievement, interest and personality. Emphasis will be placed on the importance of careful selection, appropriate administration, skilled interpretation and effective use of assessment instruments used by counselors.

**CLED 610 Guidance in Elementary and Middle Schools**
Semester course; 3 lecture hours. 3 credits. An intensive study of guidance and counseling programs for children and young adolescents. Emphasizes the role of elementary and middle school counselors in developmental counseling. Methods for individual and group counseling and classroom guidance will be discussed and practiced.

**CLED 620 Student Personnel Services in Higher Education**
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLED 601. A course that focuses attention on administration, decision making and problem solving in the area of student personnel services. Emphasizes the case study approach; students will participate in various administrative experiments requiring the employment of administrative theory and practice.

**CLED 621 Secondary School Guidance Seminar**
Semester course; 3 lecture hours. 3 credits. An advanced course designed to provide a means for intensive study of secondary school guidance. The approach will be to integrate the knowledge and skills from various disciplines as they relate to the work of the secondary school counselor.

**CLED 644 Organization and Administration of Guidance Services**
Semester course; 3 lecture hours. 3 credits. A study of organizational principles and procedures necessary for the effective administration of guidance services. Consideration is given to procedures used in establishing guidance programs or modifying existing ones (or both), including the study of various organizational units that contribute to more efficient guidance services.

**CLED 700 Externship**
Semester course; 1-6 credits. May be repeated for a maximum of 9 credits. Prerequisite: Permission of department. Plan of work designed by extern with prior approval of the offering department. State certification or equivalent may be required for some externships. Off-campus planned experiences for advanced graduate students designed to extend professional competencies, carried out in a setting, under supervision of an approved professional. Externship activities monitored and evaluated by university faculty.

### Early Childhood Special Education

**ECSE 601 Assessment of Infants and Young Children with Disabilities**
Semester course; 3 lecture hours. 3 credits. Provides knowledge and practical applications for the identification, placement and assessment for program planning and evaluation of children with disabilities ages birth through five.

**ECSE 602 Instructional Programming for Infants and Young Children with Disabilities**
Semester course; 3 lecture hours. 3 credits. Advanced study of intervention strategies for infants and preschool-aged children with disabilities. Emphasis on program planning, curriculum, classroom management, developmentally appropriate practice and effective intervention strategies.

**ECSE 603 Program Management, Collaboration and Service Coordination in Early Childhood Special Education**
Semester course; 3 lecture hours. 3 credits. Examines provisions of state and federal laws applicable to service delivery systems for infants and young children with disabilities and their families. Emphasis on service delivery models, family participation options, resource coordination and collaboration, staffing and program evaluation procedures.

**ECSE 700 Externship**
Semester course; 1-6 credits. May be repeated for a maximum of 9 credits. Prerequisite: Permission of department. Plan of work designed by extern with prior approval of the offering department. State certification or equivalent may be required for some externships. Off-campus planned experiences for advanced graduate students designed to extend professional competencies, carried out in a setting, under supervision of an approved professional. Externship activities monitored and evaluated by university faculty.

### Educational Studies

**EDUS 500 Workshop in Education**
Semester course; 1-3 credits. Repeatable to 6 credits. Designed to focus on a single topic within a curriculum area, the workshop offers graduate students exposure to new information strategies and materials in the context of a flexible instructional framework. Activities emphasize a hands-on approach with direct application to the educational setting.

**EDUS 514 Parent-child Relations**
Semester course; 3 lecture hours. 3 credits. A methods course in parent-child communication and problem solving. Designed to enable participants to distinguish educational professionals to understand and relate more effectively with children.

**EDUS 594 Topical Seminar**
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits. A seminar intended for group study by students interested in examining topics, issues or problems related to teaching and learning.

**EDUS 601 Philosophy of Education**
Semester course; 3 lecture hours. 3 credits. A study of basic philosophies that have contributed to the present-day educational system. Attention will be given to contemporary philosophies and their impact on educational aims and methods.

**EDUS 602 Adolescent Growth and Development**
Semester course; 3 lecture hours. 3 credits. Contemporary learning theories and their implications for teaching the adolescent learner. Emphasis will be placed on specific problems of adolescent growth and development as they relate to the learning situation.

**EDUS 603 Seminar in Child Growth and Development**
Semester course; 3 lecture hours. 3 credits. Intensive study of child growth and development and application of this knowledge. Emphasis on current research.

**EDUS 604 Adult Development**
Semester course; 3 lecture hours. 3 credits. An introductory study of adult development from the life cycle perspective with implications for educators working with adults. Emphasis will be placed on major physiological, psychological, sociological, and anthropological factors that make adults distinct from earlier developmental levels.

**EDUS 605 Child and Adolescent Development**
Semester course; 3 lecture hours. 3 credits. An introductory study of adult development from the life cycle perspective with implications for educators working with adults. Emphasis will be placed on major physiological, psychological, sociological, and anthropological factors that make adults distinct from earlier developmental levels.

**EDUS 606 Review of Research**
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 9 credits. Application of research findings to a specific...
EDUS 607/PSYC 607 Advanced Educational Psychology
Semester course; 3 lecture hours. 3 credits. Application of the principles of psychology to the teaching-learning process. Discussion will focus on the comprehensive development of individual counseling experiences and educational programs from the point of view of the educator and the administrator.

EDUS 608 History of Western Education
Semester course; 3 lecture hours. 3 credits. This course will explore the development of educational thought and practice from ancient times to the present, with special attention being given to the major issues confronting American education since its beginning.

EDUS 609 Learning Theories in Education
Semester course; 3 lecture hours. 3 credits. A study of learning theories applicable to education including the concepts and issues related to the teaching-learning process. Instruction and curriculum will be discussed to illustrate psychological principles of learning.

EDUS 610 Social Foundations of Education
Semester course; 3 lecture hours. 3 credits. A study of significant social issues involved in the development and operation of schools and other educational institutions and processes.

EDUS 612 Education and the World's Future
Semester course; 3 lecture hours. 3 credits. An examination of education as it relates to future changes in other areas: population, energy, transportation, family, etc. The course will consist of readings dealing with educational change as well as a series of modules where students will engage in future exercises, games and projects.

EDUS 613 Educational Change
Semester course; 3 lecture hours. 3 credits. Developing the skills for planned program change through the use of systematic inquiry, systems analysis and systems approaches through systems concepts. Provides opportunities for students to develop "mini (classroom) changes" or "macro (school district) changes" through the use of systems.

EDUS 614 Contemporary Educational Thought
Semester course; 3 lecture hours. 3 credits. This course will be devoted to a critical examination of educational ideas and programs emanating from contemporary writings on education. Students will be encouraged to develop critical skills of analysis in examining such writings utilizing historical and philosophical perspectives.

EDUS 631/ADLT 631 American College and University
3 credits. Examines historical and contemporary foundations of American higher education through the study of leading developments and of contemporary issues relating to the curriculum, aims and objectives and current directions of American colleges, universities and other institutional settings of higher education.

EDUS 632/ADLT 632 The Changing Face of Higher Education
3 credits. Examines how higher education is changing and explores the reasons for these changes; studies how the academy is responding to social pressures and explores scenarios for future change.

EDUS 633/ADLT 633 Academic Leadership in Higher Education
3 credits. Analyzes how leadership in higher education is similar to and different from leadership in other organizational settings; explores challenges for leadership (such as access, cost and social responsiveness) and examines the role of leadership at various levels of the academic organization.

EDUS 641 Independent Study
Semester course; 1-6 credits. May be repeated for a maximum of 9 credits. Determination of the amount of credit and the instructor and department chair must be procured prior to registration. Cannot be used in place of existing courses. An individual study of a specialized issue or problem in the field.

EDUS 651 Topics in Education
Semester course; 1-3 credits. May be repeated for 9 credits. Check with department for specific prerequisites. A course for the examination of specialized issues, topics, readings or problems in education.

EDUS 660 Research Methods in Education
Semester course; 3 lecture hours. 3 credits. Designed to provide an introductory understanding of educational research and evaluation studies. Emphasizes fundamental concepts, procedures and processes appropriate for use in basic, applied and developmental research. Includes developing skills in critical analysis of research studies. Analyzes the assumptions, uses and limitations of different research designs. Explores methodological and ethical issues of educational research. Students either conduct or design a study in their area of educational specialization.

EDUS 661 Educational Evaluation: Models and Designs
Semester course; 3 lecture hours. 3 credits. Prerequisite: EDUS 660 or permission of instructor. A comprehensive review of the major evaluation models including their focus, assumptions, designs, methodologies and audiences in educational policy making and program development. Designed for students to gain an understanding of alternative procedures of educational evaluation, an in-depth knowledge of at least one theoretical approach to evaluation and skills in interpretation of evaluation studies for policy and in developing an evaluation design for their area of specialization.

EDUS 662 Educational Measurement and Evaluation
Semester course; 3 lecture hours. 3 credits. Provides an understanding of basic concepts of educational measurement and evaluation. Includes development, interpretation and use of norm-referenced and criterion-referenced measures, standardized instruments and qualitative assessments applicable to a wide variety of educational programs and settings. Students will study measurement and/or evaluation procedures in their specialization.

EDUS 672 Internship
Semester course; 1-6 credits. May be repeated for a maximum of 12 credits. Prerequisite: Permission of adviser. Study and integration of theory with practice in clinical or off-campus settings supervised by an approved professional and university faculty. May include seminars, selected readings, projects and other activities designed and evaluated by supervising faculty.

EDUS 673 Seminar on Educational Issues, Ethics and Policy
Semester course; 3 lecture hours. 3 credits. An analysis of the ethical dimensions of educational policies and practices. Examines aspects of selected educational policies and practices, drawing in part from issues encountered in clinical settings. Investigates how educational policies and practices reflect ethical values and how those values are grounded.

EDUS 700 Externship
Semester course; 1-6 credits. May be repeated for a maximum of 9 credits. Prerequisite: Permission of department. Plan of work designed by extern with prior approval of externship supervisor. State certification or equivalent may be required for some externships. Off-campus planned experiences for advanced graduate students designed to extend professional competencies, carried out in a setting, under supervision of an approved professional. Externship activities monitored and evaluated by university faculty.

EDUS 701 Urban Education
Semester course; 3 lecture hours. 3 credits. A study of urban education from historical and contemporary perspectives. This course includes study of the educative effect of urban environments; the development of public and private urban educational systems; the influence of social, political and economic factors on urban educational programs; and the impact of theories, proposals, and practices on alternative futures.

EDUS 710 Educational Research Design
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate-level statistics course, and EDUS 660 or equivalent, or permission of instructor. An examination of research designs and concepts commonly utilized in conducting research in applied educational settings. Fundamental principles of research are extended to cover such topics as quasi-experimental, multivariate and qualitative research design.

EDUS 711 Qualitative Methods and Analysis
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate-level statistics course, and EDUS 660 or equivalent, or permission of instructor. Examines qualitative research designs and inductive analysis, including research traditions, problems formulation in fieldwork, purposeful sampling, data collection strategies, research reliability and validity. An interdisciplinary approach is used. Students conduct a small field study in their specialization.

EDUS 770 Educational Research Seminar
Semester course; 3 lecture hours. 3 credits. Provides doctoral students with opportunities to investigate research areas related to their doctoral studies. Students and instructor will critique student-conducted literature reviews and preliminary research proposals.

EDUS 780 Thesis
Semester course; 1-6 credits. May be repeated for a maximum of 6 credits. A research study of a topic or problem approved by the student's supervisory committee and...
completed in accordance with acceptable standards for thesis writing.

EDUS 890 Dissertation Seminar
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of adviser or dissertation chair. Designed to develop and refine the skills applicable to the preparation of an acceptable draft of a dissertation prospectus.

EDUS 899 Dissertation Research
Semester course; variable hours. Variable credit. May be repeated. A minimum of 12 semester hours required. Prerequisite: Successful completion of comprehensive examinations and approval of student’s doctoral prospectus. Dissertation work under direction of dissertation committee.

Emotional Disturbance
EMOD 500 Characteristics of Students with Emotional Disturbance
Semester course; 3 lecture hours. 3 credits. Focuses on the nature of children and youth with behavior disorders and emotional disturbances, with emphasis on psychological, biophysical, sociological and ecological factors that relate to their educational needs. Related topics include definitions and classification of disorders, school identification and assessment procedures and intervention approaches.

EMOD 501 Teaching Students with Emotional Disturbance
Semester course; 3 lecture hours. 3 credits. Prerequisite: EMED 400. Provides an in-depth study of instructional strategies and organization of activities for children and youth with behavior disorders and emotional disturbances children including curriculum, media, materials and physical environment. Develops skills to plan and deliver instruction in a variety of educational settings including regular classes, resource rooms, self-contained classes and residential programs.

EMOD 603 Interactive Strategies in Teaching Students with Special Needs
Semester course; 3 lecture hours. 3 credits. Strengthens teaching skills in affective education, social skills development and life space interviewing techniques as methods of promoting human interaction skills among students with special needs in schools. Focuses on professional skills in interpersonal relationships, communication, consultation and teamwork.

EMOD 700 Externship
Semester course; 1-6 credits. May be repeated for a maximum of 9 credits. Prerequisite: Permission of department. Plan of work designed by extern with prior approval of the offering department. State certification or equivalent may be required for some externships. Off-campus planned experiences for advanced graduate students designed to extend professional competencies, carried out in a setting, under supervision of an approved professional. Externship activities monitored and evaluated by university faculty.

English/English Education
ENED 532/ENGL 532 Applied English Linguistics
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisite: ENGL 449 or equivalent course in linguistics or permission of instructor. Application of linguistic theories and methods to selected teaching problems, such as teaching English grammar and usage, teaching English as a second or foreign language, or teaching standard English to students who speak different dialects.

ENED 601/ENGL 601 Young Adult Literature
Semester course; 3 lecture hours. 3 credits. Examination of literature written for young adults, literature appropriate for young people in middle schools and high schools. Focuses on the content, characteristics and teaching of such literature.

ENED 636/ENGL 636 Teaching Writing
Semester course; 3 lecture hours. 3 credits. Examines theories and practices of teaching writing, with emphasis on the connections between theory and practice.

ENED 643/ENGL 643 Teaching Basic Writing Skills
Semester course; 3 lecture hours. 3 credits. The emphasis of this course will be on developing the student’s ability to teach fundamental writing skills. It will include such topics as diagnosis of writing problems, strategies for correcting problems and methods for evaluating progress.

Health and Movement Sciences
HEMS 500 Motor Development of Young Children
Semester course; 3 lecture hours. 3 credits. Explores the development of small children, preschool, kindergarten and first-grade children through physical education. Emphasis will be on the construction of a program of motor development for each of these three groups. The programs will be based on the research findings in such areas as perceptual-motor development, motor learning, educational psychology and others. Those students and teachers in the fields of physical education, special education and elementary education should find this course useful in developing programs of motor development for their students.

HEMS 505 Contemporary Issues in Health
Semester course; 3 lecture hours. 3 credits. Focuses on contemporary issues related to lifestyle and health behavior. Emphasizes the factors that influence health and the lifestyle changes that promote and maintain optimal health. Issues may include sexuality, nutrition, chronic and communicable diseases, aging, environmental health, policy, and health care systems.

HEMS 507 Teaching Health in Schools
Semester course; 3 lecture hours. 3 credits. Examines health issues, family influences, teenage attitudes and signs of progress in health behavior. School health programs, including remedial, classroom instruction and environmental aspects of school life also are considered.

HEMS 514 Physical Activity for Special Populations
Semester course; 3 lecture hours. 3 credits. Provides fundamental information to students at the graduate level on physical activity programming for children with disabilities. Course content focuses on programming techniques and methods that are most effective in meeting the specific physical activity needs of the individual child. Emphasis is on Public Law 94-142 provisions currently affecting physical education programming for special populations; in particular, the development of specially designed physical education programs, individualized education programs and programming in the least restrictive environment.

HEMS 521 Pathomechanics of Sport Injuries
Semester course; 3 lecture hours. 3 credits. Addresses musculoskeletal and sports injury mechanisms from a pathomechanical and pathophysiological perspective. Focuses on acute trauma and repetitive stress injuries to the musculoskeletal system. Emphasizes evaluation and diagnostic procedures and the pathophysiology and evaluation of mild head injuries commonly acquired as part of physical activity.

HEMS 550 Exercise, Nutrition and Weight Management
Semester course; 3 lecture hours. 3 credits. Provides an in-depth analysis of the scientific principles associated with weight management strategies. Emphasizes the separate and combined effects of exercise, nutrition and behavioral interventions relative to weight loss, weight gain and weight maintenance. Includes life cycle nutrition, childhood obesity, adult obesity and chronic disease, weight management intervention strategies, eating disordered behavior and the female athlete triad.

HEMS 591/RPSL 591 Topical Seminar
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits. A seminar designed for group study by students interested in examining topics, issues or problems related to health, physical education, exercise science, recreation and sport.

HEMS 600/RPSL 600 Introduction to Research Design in Health, Movement Sciences and Recreation
Semester course; 3 lecture hours. 3 credits. Provides an understanding of the basic knowledge and methodology of research in health and movement sciences. Develops the ability to critically read and evaluate research, acquire a conceptual understanding of statistics and develop an empirical study related to healthy and diseased populations.

HEMS 601/REMS 601 Movement Physiology
Semester course; 3 lecture hours. 3 credits. Investigates the physiological processes in relation to bodily exercises in everyday life and sports activities. Functional changes in the human organism due to movement. Investigation and application of research to health and movement sciences. Students must design, conduct and write a pilot study.
HEMS 602/PSL 602 Statistical Applications in Health, Movement Sciences and Recreation
Semester course; 3 lecture hours. 3 credits. Presents theory and techniques involved in the analysis and interpretation of data pertinent to research in health, movement science and recreation. Includes statistics applied to data encountered in published health, movement science and recreation research.

HEMS 603 Applied Fitness and Nutrition for Health and Movement Science Professionals
Semester course; 3 lecture hours. 3 credits. An in-depth study of applied fitness and nutrition principles and practices. Emphasizes the application of knowledge and fundamental fitness and nutrition principles.

HEMS 604 Nutrition for Health and Physical Activity
Semester course; 3 lecture hours. 3 credits. Prerequisite: HPEX 350 or equivalent or permission of instructor. Provides an in-depth examination of basic nutrition and their effects on health, fitness and sport performance. Emphasizes an understanding of the biochemistry of metabolism and knowledge of the current research related to nutrition, health and exercise performance.

HEMS 605 Psychology of Physical Activity
Semester course; 3 lecture hours. 3 credits. Examines psychological issues related to exercise and physical activity. Includes individual and group motivation theory and techniques, affects on team performance, mental health, mental skills training, injury rehabilitation, eating disorders, exercise adherence, addiction, over training and use of ergogenic aids. Emphasizes examining current research and applications of psychological principles and knowledge in a physical activity setting.

HEMS 606 Psychosocial Aspects of Sport and Physical Activity
Semester course; 3 lecture hours. 3 credits. Examines social and psychological issues in sport and physical activity, with emphasis on socialization and motivation for sport and physical activity. Includes theories of participation and opportunities related to race, gender and social class; mental skills training for performance enhancement; aggression and violence in sport and society; and the role of sport and physical activity in the educational system. Emphasizes examining current research and applied methods in addressing these issues.

HEMS 610 Laboratory Techniques in Rehabilitation Science
Semester course; 3 hours. 3 credits. Prerequisites: HEMS 601 and/or permission of instructor. Laboratory-based course examining the various procedures related to measurement and experimentation in human performance. Includes examination of instruments designed to assess cardiovascular, musculoskeletal and pulmonary performance. Emphasis is given to application of instrumentation to physical training in healthy and diseased populations and to treatment and rehabilitation in a clinical setting.

HEMS 611/REMS 611 Biomechanics of Human Motion
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Application of the knowledge and methods of mechanics in the study of the structure and function of the human body as applied to sport, physical activity and rehabilitation. Topics include kinematics, kinetics and methods of biomechanical analysis.

HEMS 612 Administration and Supervision of Physical Education
Semester course; 3 lecture hours. 3 credits. Gives guidelines for administrative and supervisory policies and problems in physical education and explores observation techniques, standards for judging instruction, the supervisory conference and cooperative supervision. Emphasis is placed upon the common problems met by administrators and supervisors.

HEMS 613 General Motor Ability Evaluation
Semester course; 3 lecture hours. 3 credits. Investigates the theory of the construction of evaluative instruments. Emphasizes an understanding of the development, use and evaluation of existing measurement devices. An analysis of the use of measurement as a tool for improving physical education programs.

HEMS 614 Motor Assessment for Special Populations
Semester course; 3 lecture hours. 3 credits. Prerequisite: HEMS 514 or permission of instructor. Provides the student with basic knowledge regarding motor tests and observational instruments that assess and evaluate special populations. Focuses on the analysis of these tests as to their 1) main components and 2) how to use these components to measure students; 2) administration, i.e., time, administrator's experience, group size, validity and reliability; and 3) use in establishing and monitoring annual goals and short-term objectives for an individualized education program.

HEMS 615 Orthopaedics and Therapeutics in Sports Medicine
Semester course; 3 lecture hours. 3 credits. Provides in-depth study of techniques used in orthopaedics and physical medicine. Includes lectures and presentations by physicians, surgeons and other health care personnel. Focuses on linking diagnostic and surgical techniques used in orthopaedics and physical medicine to the rehabilitative treatment plan. Emphasizes the diagnosis and treatment of neuromuscular diseases and adaptive technologies for disabled populations.

HEMS 620 Motor Learning and Performance
Semester course; 3 lecture hours. 3 credits. Analysis of early patterns of behavior and the development tools used in child development, adolescence, and adulthood. Consideration of differences in motor proficiency and factors affecting the acquisition of motor skills and concepts of motor learning with reference to the improvement of instructional practices.

HEMS 621 Sports Medicine
Semester course; 3 lecture hours. 3 credits. Prerequisite: HEMS 621 or permission of instructor. Designed to give the student knowledge in the principles of prevention and treatment of athletic injuries. The course includes advanced first aid techniques and the more sophisticated means of athletic training. Students are exposed to such modalities as mechanical therapies, thermal therapy, cryotherapy, hydrotherapy and electrotherapy. One major component of the course deals with therapeutic exercise and its use in the rehabilitation of the injured athlete.

HEMS 660/REMS 660 Neuromuscular Performance
Semester course; 3 lecture hours. 3 credits. Prerequisites: HEMS 601 and HEMS 611. Examines the interrelationships between the musculoskeletal and neuromuscular systems. Includes examination of normal and abnormal biomechanics of the musculoskeletal system, neuromuscular factors related to human performance, as well as acute and chronic adaptations of the neuromuscular system. Emphasizes how these principles can be applied to physical training in healthy and diseased populations and treatment and rehabilitation in the sports medicine setting.

HEMS 675/REMS 675 Clinical Exercise Physiology
Semester course; 3 lecture hours. 3 credits. Prerequisite: HEMS 601. Examines theoretical and functional techniques of graded exercise testing for functional and/or diagnostic assessment. Topics include pulmonary, cardiovascular, respiratory and neuromuscular physiology, and the principles and skills of exercise prescription based on metabolic calculations.

HEMS 690 Research Seminar in Health and Movement Sciences
Semester course; 1-3 credits. May be repeated for a maximum of 3 credits. Provides opportunities for presentation and discussion of current research and topics of interest in health and movement sciences. Presents relevant research for discussion delivered by guest researchers, faculty and students.

HEMS 691 Topics in Health and Movement Sciences
Semester course; 1-3 credits. May be repeated for 9 credits. Check with division head for specific prerequisites. Examines specialized issues, topics, readings or problems in health and movement sciences.

HEMS 692/REMS 692 Independent Study
Semester course; 1-3 credits. May be repeated for 6 credits. Determination of the amount of credit and permission of the instructor and division head must be procured prior to registration. Cannot be used in place of existing courses. An individual study of a specialized issue or problem in health or movement sciences.

HEMS 695 Externship
Semester course; 1-6 credits. May be repeated for 6 credits. Prerequisite: Permission of division head. Plan of work designed by extern with prior approval of the offering department. State certification or equivalent may be required for some externships. Off-campus planned experiences for advanced graduate students designed to extend professional competencies in health and movement sciences. Directed by university faculty in cooperation with clinical on-site supervisors.

HEMS 797 Directed Research Study
Semester course; 1-3 credits. May be repeated for a maximum of 6 credits. A research study of a topic or problem approved by the student's adviser and completed in accordance with division policy regarding the directed research study.

HEMS 798 Thesis
Semester course; 1-6 credits. May be repeated for a maximum of 6 credits. A research study of a topic or problem approved
by the student’s supervisory committee and completed in accordance with acceptable standards for thesis writing.

**Interdisciplinary Developmental Disability Studies**

**IDDS 600 Interdisciplinary Studies in Developmental Disabilities: Teamwork in Serving Persons with Developmental Disabilities**
Semester course; 3 lecture hours. 3 credits. Provides information and activities on models of teamwork, group decision making, team process, leadership and communication and how they influence services for persons with disabilities and their families; content/discussion focuses on the roles and functions of individuals from various disciplines (including parents) as team members; includes case studies and simulations of interdisciplinary team in action.

**IDDS 601 Resilience: Models, Research and Applications**
Semester course; 3 lecture hours. 3 credits. Overview of resilience models and research across the life span in diverse populations. Interdisciplinary emphasis on applying this overview to prevention and intervention programs at individual, family, school, community and societal levels.

**IDDS 691 Special Topics in Developmental Disabilities**
Semester course; 1-3 lecture hours. 1-3 credits. Prerequisite: Permission of graduate faculty adviser, course faculty coordinator, and director of preservice training at the Virginia Institute for Developmental Disabilities. Explores specific interdisciplinariany content and issues in the field of developmental disabilities and examines the practice approaches of multiple disciplines.

**IDDS 692 Directed Study in Developmental Disabilities**
Variable hours. 1-4 credits. Prerequisite: Permission of graduate faculty adviser and director of preservice training at the Virginia Institute for Developmental Disabilities. Provides an opportunity for study in a specific area of interdisciplinary practice in developmental disabilities developed under the supervision of a member of the graduate faculty.

**Mental Retardation**

**MNRT 500 Language/Communication Intervention for Young Children and Individuals with Severe Disabilities**
Semester course; 3 lecture hours. 3 credits. Prerequisite: Admission to the program. An intensive study of the developmental sequence of language/communication acquisition and intervention strategies for infants, young children, and individuals with severe language delays or deficits, severe mental retardation, and/or other severe disabilities.

**MNRT 556 Introduction to Mental Retardation**
Semester course; 3 lecture hours. 3 credits. Initial graduate offering for special education majors concentrating in mental retardation. Includes review and discussion of all ages and levels of individuals with mental retardation. Analysis of major issues in mental retardation such as deinstitutionalization, inclusion in school and community services, client advocacy, family involvement and new techniques in intervention and prevention.

**MNRT 560 Curriculum Design for Students with Mental Retardation**
Semester course; 3 lecture hours. 3 credits. Prerequisites: TEDU 330 or equivalent, and MNRT 556. Examines issues and strategies required in selecting and developing curriculum for students with mental retardation. Emphasizes three components: the content and skills from resources used in teaching particular topics, instructional design procedures and ways of coordinating and delivering instruction to students with mental retardation.

**MNRT 602 Assessment and Curriculum Development for Students with Severe Disabilities**
Semester course; 3 lecture hours. 3 credits. Addresses functional assessment strategies, IEP development, and curriculum organization and implementation for students with severe disabilities. Emphasizes educating learners in the least restrictive environment using a transdisciplinary approach.

**MNRT 610 Teaching Strategies for Students with Severe Disabilities**
Semester course; 3 lecture hours. 3 credits. This course is designed to provide instruction in teaching methods for individuals with severe behavior, learning or emotional disabilities. Emphasis will be placed on instructional program development, task analysis and methods of precision teaching.

**MNRT 700 Internship**
Semester course; 1-6 credits. May be repeated for a maximum of 9 credits. Prerequisite: Permission of department. Plan of work designed by extern with prior approval of the offering department. State certification or equivalent may be required for some externships. Off-campus planned experiences for advanced graduate students designed to extend professional competencies, in a setting, under supervision of an approved professional. Externship activities monitored and evaluated by university faculty.

**Reading**

**READ 600 Analysis and Correction of Reading Problems**
Semester course; 3 lecture hours. 3 credits. Prerequisites: TEDU 561 or 549. An analysis of factors relating to reading difficulty. Diagnostic testing procedures and instructional strategies appropriate for the reading specialist in clinical and classroom settings will be emphasized.

**READ 601 Psycholinguistics and Language Arts Curriculum**
Semester course; 3 lecture hours. 3 credits. An investigation of theoretical and instructional processes involved in language behavior and the relationship of these processes to the teaching of the basic communication skills.

**READ 602 Teaching Reading to Adults**
Semester course; 3 lecture hours. 3 credits. Examines strategies appropriate for teaching adult readers functioning at levels ranging from beginning to college level. Analyzes basic reading concepts, skills, strategies and adult reading methods and materials. Focuses on adapting teaching techniques for use with adults in various organizational patterns.

**READ 605 Organizing and Implementing Reading Programs**
Semester course; 3 lecture hours. 3 credits. Prerequisites: TEDU 561, READ 600 and TEDU 672, or permission of instructor. Integrates reading theory with program implementation. Analyzes the role of the reading specialist as related to program design, assessment, supervision, coordination, and resource responsibilities. Includes specific field-based requirements.

**READ 672 Internship**
Semester course; 1-6 credits. May be repeated for a maximum of 12 credits. Prerequisites: Permission of adviser, Study and integration of theory with practice in clinical or off-campus settings supervised by an approved professional and university faculty. May include seminars, selected readings, projects and other activities designed and evaluated by supervising faculty.

**READ 691 Topics in Reading**
Semester course; 3 lecture hours. 3 credits. Prerequisites determined by topic. Examines recent trends and topics in the field. Includes review of pertinent research, examination of policy issues and investigation of historical movements. Clinical application is included as appropriate.

**Recreation, Parks and Sport Leadership**

**RPSL 506 Contemporary Issues in Therapeutic Recreation**
Semester course; 3 lecture hours. 3 credits. Prerequisite: RPSL 311, 472 or equivalent. An examination of contemporary issues affecting the delivery of leisure services and programs to disabled persons. Both the scope and nature of leisure opportunities available to disabled individuals are considered.

**RPSL 510 Tourism Policy**
Semester course; 3 lecture hours. 3 credits. The examination of tourism policy with emphasis upon components involved in the formulation and implementation of public policy. The course will include an analysis of the legislative programs of regional and national tourism organizations.

**RPSL 591/HEMS 591 Topical Seminar**
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits. A seminar intended for groups of students interested in examining topics, issues or problems related to health, physical education, exercise science, recreation and sport.

**RPSL 600/HEMS 600 Introduction to Research Design in Health, Movement Sciences and Recreation**
Semester course; 3 lecture hours. 3 credits. Provides an understanding of the basic knowledge and methodology of research in health and movement sciences. Develops the ability to critically read and evaluate research, acquire a conceptual understanding of the role of research in healing and the development of an empirical study related to healthy and diseased populations.

**RPSL 601 Conceptual Foundations of Leisure Services**
Semester course; 3 lecture hours. 3 credits. A study of the development of the leisure
services and sports movement in the United States. Attention will be given to the historical, philosophical and social bases of leisure services and sports in today's society. Implications for present and future leisure services and sports planning will be emphasized.

**RPSL 602/HEMS 602 Statistical Applications in Health, Movement Sciences and Recreation**
Semester course; 3 lecture hours. 3 credits. Presents theory and techniques involved in the analysis and interpretation of data pertinent to research in health, movement sciences and recreation. Includes statistics applied to data encountered in published health, movement sciences and recreation research.

**RPSL 603 Research and Evaluation Processes in Recreation, Parks and Sport Systems**
Semester course; 3 lecture hours. 3 credits. Familiarizes student with the scientific approach to inquiry as applied to the study of the phenomenon of leisure, recreation and sport. Explores basic research terminology, methodology, procedures and concepts with particular reference to the application of empirical investigation to topics of interest to professionals in the field of recreation, parks and sport.

**RPSL 604 Research Practicum**
Semester course; 3 lecture hours. 3 credits. Prerequisite: RPSL 603. Focuses on conceptualizing a problem and writing a professional paper or the first part of a research study (either RPSL 797 Research Project or RPSL 798 Thesis) on a topic in recreation, parks and sport agency. Can be repeated for a maximum of 9 credits. Directed by university faculty in cooperation with placement site directors.

**RPSL 605 Program Development in Therapeutic Recreation**
Semester course; 3 lecture hours. 3 credits. This course will provide students with an opportunity to critically examine contemporary models of leisure service programming with special reference to the phenomenon of leisure services for persons with disabilities. Emphasis will be placed upon observation and analysis of medical-clinical custodial, therapeutic community/milieu and education and training approaches to recreation for persons with disabling conditions.

**RPSL 606 Directed Readings**
Semester course; 3 credits. Prerequisite: Permission of instructor. Provides student with the opportunity to pursue an independent research project or extensive literature review under the supervision of an instructor. Independent work by student must be preceded by the instructors review and approval of the proposal. Cannot be used in place of existing courses.

**RPSL 607 Field Instruction**
Semester course; 150-360 clock hours. 3 credits. Enrollment only by permission of adviser. Application of theoretical knowledge as a practicing professional in a recreation, parks and sport agency or enterprise. A faculty member and field supervisor assess basic knowledge, attitudes and skills necessary to function as a provider or manager or leisure services or sports system.

**RPSL 608 Analysis and Planning for Travel and Tourism**
Semester course; 3 lecture hours. 3 credits. Analysis and planning of travel and tourism resources in the development of an effective comprehensive tourism services delivery system.

**RPSL 609 Program Development and Management**
Semester course; 3 lecture hours. 3 credits. Analyzes the individual, political and societal determinants of recreation and sport programming. Covers the factors influencing leisure behavior and the role of the program supervisor in recreational and sport settings. Presents the evaluation of recreation and sport programs and the research functions in recreation programming.

**RPSL 610 Organization and Administration of Recreation and Parks Systems**
Semester course; 3 lecture hours. 3 credits. An analysis of administrative theories and patterns of management appropriate to the establishment and operation of a personnel and program service. Special emphasis will be given to organizational planning, goal setting, financial support, program evaluation and the role of the administrator in a leisure service setting.

**RPSL 630 Sociology of Sport**
Semester course; 3 lecture hours. 3 credits. Restricted to sport leadership majors. Provides a systematic study of human behavior as it occurs in and is influenced by social groups, institutions, organizations and societies. Provides an understanding of sport as a social phenomenon and examines principles that govern social behavior and sport. Identifies the consequences of various social structures and critically examines these consequences based on the student's own ethical and moral positions.

**RPSL 631 Contemporary Issues**
Semester course; 3 lecture hours. 3 credits. Restricted to sport leadership majors. Provides the opportunity to investigate contemporary issues in sports today. Issues utilized for discussion include ethics and values in sports and issues, ownership rights and issues, media in sports and media's impact on sports, sports agents, women in sport business, Title IX and gender equality, and social structures.

**RPSL 632 Sports Business**
Semester course; 3 lecture hours. 3 credits. Restricted to sport leadership majors. Provides an in-depth examination of pertinent aspects of business and law as applied to the sports industry. Topics include contract and tort, risk and reliability, organization structure and management, budget and business plans, and facility management. Provides the basic principles of business law necessary for successful entry into sports related careers.

**RPSL 633 Sports Marketing**
Semester course; 3 lecture hours. 3 credits. Restricted to sport leadership majors. Provides a thorough understanding of the practice of contemporary marketing in sports business. Focuses on the concepts and issues of marketing in relation to target markets at all levels of sport enterprise. Presents the marketing mix and its utilization.

**RPSL 634 Coaching and Administration**
Semester course; 3 lecture hours. 3 credits. Restricted to sport leadership majors. Acquaints the student with principles, techniques and functions related to coaching and administrative fundamentals for any sport. Special emphasis is on communication, motivation, organization and team building for success. Provides an understanding and overview of multiple elements that contribute to successful and productive coaching of athletes and managing athletics programs.

**RPSL 635 Leadership Models in Sports**
Semester course; 3 lecture hours. 3 credits. Restricted to sport leadership majors. Acquaints the student with principles, techniques and functions related to management and leadership in all organizations. Focuses on the impact of leadership on organizations and their members. Discusses key ingredients of successful management and visionary leadership.

**RPSL 690 Seminar**
Semester course; 3 lecture hours. 3 credits. Restricted to second-semester graduate students who have completed the research methods course. Individual projects and research topics will be discussed as will topics of current, specialized interest to the recreation, parks or sport fields.

**RPSL 691 Topics in Recreation and Sports Management**
Semester course; 1-3 credits. May be repeated for a maximum of 9 credits. Determination of the amount of credit and permission of the instructor and department chair must be procured prior to registration. Cannot be used in place of existing courses. An individual study of a specialized issue or problem in recreation.

**RPSL 692 Independent Study**
Semester course; 1-3 credits. May be repeated for a maximum of 9 credits. Prerequisite: Permission of the fieldwork supervisor. Provides the opportunity to pursue an independent study project. Plan of work designed by the student and approved by the department and faculty. Directed by university faculty in cooperation with placement site directors.

**RPSL 693 Recreational Systems Planning**
Semester course; 3 lecture hours. 3 credits. General principles of planning and development of local and regional recreation areas and facilities. Investigation of standards relative to size, location and programs. Review of national and statewide outdoor recreation policies and trends in recreation development. A practical exercise in recreation planning to be completed in the field.

**RPSL 797 Research Project**
Semester course; 3 lecture hours. 1-3 credits. Prerequisite: RPSL 603 or RPSL 604. The research project involves a systematically planned and executed scholarly project utilizing an approved methodology for investigating and reporting on a major issue.
pertinent to the student's interest in the recreation, parks and tourism fields.

**RPSL 798 Thesis**
3 credits with 1 credit extension. Prerequisites: RPSL 603 and RPSL 604. The master’s thesis involves a carefully planned and executed research study under the supervision of an adviser and thesis committee utilizing the traditional standards for thesis writing.

**Rehabilitation and Movement Science**

**REMS 608/PHTY 608 Advanced Musculoskeletal Sciences**
Semester course; 3 lecture hours. 3 credits. Examines the structure and function of tissues of the musculoskeletal system. Investigates mechanisms of healing of these tissues and explores the affects of various modalities, altered use on the structure and function of musculoskeletal tissues.

**REMS 612/PHTY 602 Advanced Biomechanics**
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: REMS/HEMS 611 or permission of instructor. Designed for students in the interdisciplinary Ph.D. in Rehabilitation and Movement Science. Covers advanced biomechanics techniques for the evaluation and quantification of human performance. Encourages scientific thought with practical applications.

**REMS 665 Instrumentation in Motion Analysis**
2 lecture and 2 laboratory hours. 3 credits. Designed for students in the interdisciplinary Ph.D. in Rehabilitation and Movement Science Program. Examines theories, principles, and applications of systems used to qualify and characterize movement.

**REMS 690 Research Seminar in Rehabilitation and Movement Science**
Semester course; 1 credit. Seminar course designed for students in the interdisciplinary Ph.D. in Rehabilitation and Movement Science Program. Presentation and discussion of research reports and topics of interest. Advances skills in critical analysis and discussion leadership. Topics and research presentations vary from semester to semester and are coordinated by the instructor of record. May be repeated. Graded as pass/fail.

**REMS 710 Research Techniques in Rehabilitation and Movement Science**
50 hours of laboratory times per credit hour. 1-3 credits. Prerequisite: Permission of instructor required. Examines and explores laboratory techniques used in rehabilitation and movement science research. Provides opportunity to begin transitioning clinical problems to research questions. Opportunities in laboratories of the rehabilitation and movement science program or other laboratories approved by the adviser or program director. Focuses on individual student learning needs. Graded as pass/fail.

**REMS 793 Teaching Practicum in Higher Education**
50 hours of contact/preparation time for each credit. 1 credit. Practicum designed for students in the interdisciplinary Ph.D. in Rehabilitation and Movement Science degree program. Develops skills necessary for classroom teaching including preparing and presenting selected topic(s), writing test questions, and grading examinations. May be repeated for additional teaching experience. Graded as pass/fail.

**REMS 794 Research Presentation Seminar**
1 lecture hour. 1 credit. Seminar course designed for students in the interdisciplinary Ph.D. in Rehabilitation and Movement Science Program. Develops presentation skills. Requires preparation and presentation of research at a public research forum scheduled by the instructor of record. Students are expected to submit their research for presentation at a selected regional, national or international conference in a related field. Graded as pass/fail.

**REMS 798 Research in Rehabilitation and Movement Science**
Semester course; 1-12 credits. Research leading to the master's degree and elective research projects for students in the Rehabilitation and Movement Science doctoral program. May be repeated. Graded as “S,” “U” or “F.”

**Special Education – Learning Disabilities**

**SELD 501 Methods of Clinical Teaching**
Semester course; 3 lecture hours. 3 credits. Prerequisites: TEDU 533 and SELD 444, or SELD 600. Special topics in teaching individuals with identified precognitive and cognitive learning disabilities. Includes the use of developmental, remedial and compensatory approaches for instruction in basic skills and accommodation to individual learning styles.

**SELD 530 Language Disabilities: Assessment and Teaching**
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor or equivalent. Students learn how to teach oral language development as a basis for understanding students who experience specific or generalized difficulties in learning a first language. Includes diagnostic and instruction strategies with an emphasis on the interrelationships of language content and use.

**SELD 531 Collaborative/Consultation Skills for Working with Families and Professionals**
Semester course; 3 lecture hours. 3 credits. Focuses on the context, processes and content for collaboration and consultation. Students will learn how to be an effective collaborator/special educator working with other professionals and parents.

**SELD 600 Characteristics of Persons with Learning Disabilities**
Semester course; 3 lecture hours. 3 credits. The nature and needs of individuals with learning disabilities, with emphasis upon psychological and behavioral characteristics as related to educational needs.

**SELD 611 Teaching the Adolescent with Learning Disabilities**
Semester course; 3 lecture hours. 3 credits. An advanced course in identifying, diagnosing, and remediating academic learning problems in the adolescent. Explores the organization, selection and implementation of compensatory programs and methods under the impact of cognitive, motivational, curricular, social and vocational factors.

**SELD 620 Advanced Educational Diagnosis of Developmental Processes**
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 633 or permission of instructor. Must be taken concurrently with Clinical Experience. An advanced course in the assessment and diagnosis of educationally relevant developmental processes in students with exceptionalities, including perception, cognition, language and socialization. Develops skill in utilization and interpretation for educational purposes.

**SELD 631 Aural Rehabilitation**
Semester course; 3 lecture hours. 3 credits. A detailed review in techniques for teaching lip reading and auditory training for the hearing-impaired child.

**SELD 677 Transition and Life Span Issues for Individuals with Learning Disabilities**
Semester course; 3 lecture hours. 3 credits. Explores issues and the literature related to the life span issues and trends that are relevant to school-age learning disabled population in transition, as well as the life span issues found beyond transition and throughout adulthood. The full range of functioning is addressed in the areas of education, employment, social/emotional functioning and personal and daily living issues.

**SELD 700 Externship**
Semester course; 1-6 credits. May be repeated for a maximum of 9 credits. Prerequisite: Permission of department. Plan of work designed by extern with prior approval of the offering department. State certification or externship may be required for some externships. Off-campus planned experiences for advanced graduate students designed to extend professional competencies, carried out in a setting, under supervision of an approved professional. Externship activities monitored and evaluated by university faculty.

**Teacher Education**

**TEDU 400 Independent Study**
Semester course; 1-6 hours. 1-6 credits. Opportunities are provided for supervised research and independent study in selected areas. Designed for advanced students. All work offered on an individual basis with the approval of instructor and departmental chair.

**TEDU 494 Topical Seminar in Education**
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits. A seminar intended for group study by personnel interested in examining topics, issues or problems related to the teaching, learning and development of students.

**TEDU 500 Workshop in Education**
Semester course; 1-3 credits. Repeatable to 6 credits. Designed to focus on a single topic within a curriculum area, the workshop offers graduate students exposure to new information strategies and materials in the context of a flexible instructional framework. Activities emphasize a hands-on approach with direct application to the educational setting.

**TEDU 501 Working with the Student Teacher**
1-3 credits. A focus on the role of the cooperating teacher during the student teaching experience. Overview of techniques
TEDU 503 Guidance for Exceptional Children
Semester course; 3 lecture hours. 3 credits.
An introduction to guidance strategies for assisting exceptional children. Special attention is given to the interrelationships of home, school, and community resources.

TEDU 504 Film as a Teaching Resource
Semester course; 3 lecture hours. 3 credits. Exploring the film as a teaching resource. The course is designed to familiarize the students with thought provoking films. Over 50 films will be presented. Especially helpful for the English teacher will be the exploration of the relationship between film and fiction. The humanities teacher will find a repertory of films on topics relating to historical and social questions useful.

TEDU 507 Survey of Educational Media
Semester course; 3 lecture hours. 3 credits. Introduction to the role of educational media and technology in the instructional process. Emphasizes the systematic design of instruction and the selection, evaluation and utilization of media. Basic production skills and equipment operation are developed within a framework for designing appropriate learning activities.

TEDU 509 TV in the Classroom
Semester course; 3 lecture hours. 3-6 credits. Video taped teaching-learning materials for specified learner outcomes will be designed and produced. Educational broadcasting and the use of commercial broadcast programs will be examined.

TEDU 517 Science Education in the Elementary School
Semester course; 3 lecture hours. 3 credits. A course designed to renew and/or expand teachers' knowledge and skills in the teaching of science in the classroom and the community. Emphasis will be placed on current trends, research findings, and professional recommendations.

TEDU 521 Teaching Mathematics for Middle Education
Semester course; 3 lecture hours. 3 credits. Emphasis on current instructional strategies, learning theories and manipulative materials appropriate for teaching mathematics to children. The content focuses on middle grades, but the developmental approach includes some topics from the primary grades.

TEDU 522 Teaching Mathematics for Elementary Education
Semester course; 3 lecture hours. 3 credits. Emphasis on current instructional strategies, learning theories and manipulative materials appropriate for teaching mathematics to children. The content focus is on the primary and elementary grades.

TEDU 523 Implementing and Administering Programs for Young Children
Semester course; 3 lecture hours. 3 credits. Provides the student with knowledge and skills in the implementation, supervision and administration of educational programs in schools, centers and homes for infants and young children. A problems approach will be utilized with emphasis on creative management and evaluative processes.

TEDU 524 Cross-cultural Perspectives in Child Rearing and Early Education
Semester course; 3 lecture hours. 3 credits. Analysis of the impact of linguistic patterns, child-rearing techniques, and socialization processes on the education of young children in various cultural settings.

TEDU 525 Teaching Language Arts
Semester course; 3 lecture hours. 3 credits. Teaching techniques and materials for the developmental instruction of communication skills. Students will explore significant research and current literature related to content, organization and instruction in language arts for the elementary and middle schools.

TEDU 528/ENGL 528 Children's Literature II
Semester course; 3 lecture hours. 3 credits. A study of classic and current children's books from a variety of perspectives. Magazines and media related reference resources and journals are reviewed. The creative use of literature, its sociocultural functions and its contribution to the development of the oral and written expression of children from nursery to grade eight are explored. A focus on children with special problems is included.

TEDU 531 Collaborative/Consultation Skills for Working With Families and Professionals
Semester course; 3 lecture hours. 3 credits. Focuses on the context, processes and content for collaboration and consultation. Students will learn how to be an effective collaborator/consultant working with other professionals and parents.

TEDU 533 Educational Assessment of Individuals with Exceptionalities
Semester course; 3 lecture hours. 3 credits. An examination of standardized tests and informational techniques, and their application in educational settings. Skills needed for administration, interpretation and application of such techniques in the development and understanding of individualized educational programs (IEPs) are developed.

TEDU 534 Photography in Instruction
Semester course; 3 lecture hours. 3 credits. Skills with cameras, films, papers and other photographic equipment and materials. The use of these materials as tools for teaching and the skills for preparation of instructional resources will be discussed and practiced.

TEDU 535 Problems of Social Studies Instruction
Semester course; 3-6 credits. Prerequisite: Permission of instructor and appropriate teaching experiences. An in-depth investigation into the nature of and alternatives to problems encountered by students while teaching. Developing and evaluating instructional alternatives will be stressed.

TEDU 537 Secondary School Curriculum
Semester course; 3 lecture hours. 3 credits. Studies the background and objectives of the contemporary secondary school; basic issues, current trends and practices in curriculum construction and instructional planning are examined.

TEDU 538 Orientation to Speech and Language Disorders
Semester course; 3 lecture hours. 3 credits. An introduction to the history, scope and trends in the field of speech pathology to include terminology, systems of classification and concepts of etiology, diagnosis and therapy.

TEDU 540 Teaching Middle and High School Sciences
Semester course; 3 lecture hours. 3 credits. Examines the teaching strategies, materials and objectives of the sciences in middle and high schools. Emphasizes the nature of science in science instruction, teaching of experimental design and translating science education research into teaching practices.

TEDU 541 Infants and Young Children with Special Needs
Semester course; 3 lecture hours. 3 credits. An overview of the characteristics of infants and preschool-aged children at risk for or with disabilities. Examines various disabilities, the rationale for early intervention and available resources.

TEDU 542 Family/Professional Partnerships
Semester course; 3 lecture hours. 3 credits. Theory and practicum work with families of children with disabilities. Family-centered services and cultural sensitivity are emphasized. Provides an overview of family processes and reactions to having a child with a disability, strategies for helping family members support and work with their children, available community resources and legal rights of families and children with disabilities.

TEDU 543 Teaching Secondary School Foreign Languages
Semester course; 3 lecture hours. 3 credits. Examines objectives, materials, effective instructional strategies, and assessment procedures in the teaching of modern foreign languages. Focuses on a thorough understanding of current developments in foreign language pedagogy and their application to teaching and listening, speaking, reading, and writing skills. Provides theoretical and practical experiences for planning and implementing effective instruction designed to facilitate student acquisition of communicative proficiencies.

TEDU 544 Introduction to the Middle School
Semester course; 3 lecture hours. 3 credits. An examination of the nature and capabilities of the middle school student, the school environment, teacher characteristics, instructional modes, the curriculum and the future of the middle school movement.

TEDU 545 Teaching Secondary School Mathematics
Semester course; 3-6 credits. Prerequisite: Upper-division mathematical sciences major. Examines materials, resources, innovations, procedures, methods, equipment and learning strategies for decision making related to the teaching of secondary mathematics.

TEDU 547 Teaching Secondary School Social Studies
Semester course; 3 lecture hours. 3 credits. Examines decision making in secondary social studies instruction; preparatory approaches to using academic and professional insights in confronting the demands; formulating and implementing appropriate methods/techniques.

TEDU 548 Teaching Secondary School English
Semester course; 3 lecture hours. 3 credits. Studies teaching strategies, materials and
objectives for literature, language, and composition; developing and organizing English instruction; applying learning theory; examining evaluation strategies; questioning techniques and classroom management.

TEDU 549 Diagnostic Reading in the Secondary School
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 561 or 562 or permission of instructor. For prospective and practicing secondary school teachers. Studies diagnostic teaching of reading and techniques to help struggling readers in grades 6 through 12, as well as the role of the secondary reading specialist in reading instruction. Reading levels and selection of appropriate materials are considered. Various techniques and strategies for improving reading are investigated. Emphasis on evaluation of reading progress, differentiation of instruction, reading difficulties, and diagnostic and prescriptive processes. Course techniques are practiced with students in grades 6 through 12.

TEDU 550 Teaching Interdisciplinary Language Arts and Social Studies in the Middle School
Semester course; 3 lecture hours. 3 credits. Describes and applies basic principles of middle school education and early adolescence with attention to the persistence of the academic disciplines and traditional curricular models in English and social studies. Offers a rationale for interdisciplinary instruction and proposes solutions to the practical dilemmas that confront interdisciplinary teaching in the middle school. Identifies interdisciplinary themes drawn from history, the social sciences and literature; plans units of instruction around such themes; devises instructional strategies for the teaching of interdisciplinary skills and content.

TEDU 552/ENGL 552/LING 552 Teaching English as a Second Language
Semester course; 3 lecture hours. 3 credits. Provides students who plan to teach English to people whose native language is not English with a variety of instructional/learning strategies. Presents and explores current approaches and methodology, as these relate to linguistic features and pedagogy.

TEDU 554/CMSC 554 Applications of Computers in the Teaching of Mathematics
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: College calculus course or permission of instructor. Introduction to computers and programming using the language, BASIC. Applications of the computer in algebra, geometry, trigonometry, statistics and calculus.

TEDU 555 Geography in Social Studies Curriculum
Semester course; 3 lecture hours. 3 credits. A survey of geographic concepts and processes as a basis for examining curricular projects for and developing instructional approaches to geography as part of the social studies curriculum.

TEDU 556 Computer Applications in Education
Semester course; 3 lecture hours. 3 credits. Designed for persons who use, or plan to use, computers in the educational process. Emphasis will be placed on the role of computer technology in education, applications in various educational fields, the selection and evaluation of appropriate software and the design of basic instructional programs.

TEDU 558 Students with Multiple Disabilities
Semester course; 3 lecture hours. 3 credits. Examines the educational, social, physical, and health care needs of students who possess both cognitive and physical/sensory disabilities. Focuses on specific strategies for positioning and handling students, assessing skills and developing goals collaboratively. Emphasizes techniques for meeting the needs of students with deaf-blindness and students with special health-care needs.

TEDU 561 Reading Foundations: Sociological/Psychological Perspectives
Semester course; 3 lecture hours. 3 credits. The purpose of this course is to provide a basic understanding of the theories, processes, and methodologies of reading instruction. Multidisciplinary, multicultural aspects of reading instruction are stressed. Topics of particular importance to the classroom teacher are emphasized.

TEDU 562 Reading Instruction in the Content Areas
Semester course; 3 lecture hours. 3 credits. Prepares teachers to apply skills and methods of reading instruction to content areas in elementary, middle and secondary school curricula. Includes theoretical bases and methodology for incorporating reading skills and strategies within content areas of instruction.

TEDU 564 Teaching the Gifted
Semester course; 3 lecture hours. 3 credits. Curriculum development and organization of activities for the gifted at different maturational levels with specific attention given to program content, materials, resources and guidance.

TEDU 566 Diagnosis and Remediation in Reading
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 426 or permission of instructor. Studies reading problems by focusing on reading diagnosis and correction related to classroom and clinic. Involves evaluating and tutoring individuals with reading difficulties. A supervised practicum is a component.

TEDU 569 Diagnosis and Remediation in Mathematics
Semester course; 3 lecture hours. 3 credits. For classroom and resource teachers working with children whose arithmetic achievement is significantly lower than grade-level placement or expectancy level; designed to remEDIATE learning problems in arithmetic at the child’s level and to aid teachers in the sequential development of skills and concepts.

TEDU 573 Introduction to Learning Disabilities
Semester course; 3 lecture hours. 3 credits. Not for program majors, recertification, or endorsement. An overview of individuals with learning disabilities within the educational setting through the discussions of current research, simulations and guided field experiences. Recommended for teachers and other personnel who seek the understanding and skills to cope with learning problems in their own setting.

TEDU 575 Cross-cultural Communications
Semester course; 3 lecture hours. 3 credits. An experimentally oriented seminar for persons preparing for or in careers demanding close working relations with numbers of differing cultural/ethnic backgrounds, primarily white/black. Supported by out-of-class readings and exercises, the class will focus on attitudes, opinions and self-perceptions operative within the seminar and on relating these to race relations problems and change strategies within the larger society.

TEDU 578 Creative Rhythmic Movement
Semester course; 3 lecture hours. 3 credits. A study of the importance and place of movement and music in a school program, the and the uses of these media in teaching. Emphasis will be placed upon music as an accompaniment for movement and movement as an accompaniment for music. Attention will be given to analysis, improvisation and creativity.

TEDU 591 Social Studies Education in the Elementary School
Semester course; 3 lecture hours. 3 credits. A course designed to renew and/or expand the knowledge and skills of the classroom teacher in the teaching of social studies. Curriculum emphasis on the development of knowledge, skills, values and attitudes will be examined in the light of professional recommendations, changes, trends and findings.

TEDU 594 Topical Seminar
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits. A seminar intended for group study by students interested in examining topics, issues or problems related to teaching and learning.

TEDU 595 Reference and Bibliography
Semester course; 3 lecture hours. 3 credits. A study and evaluation of basic reference books and other bibliographical material most frequently used to answer reference questions in a library, including applications of computer technology.

TEDU 596 Library Organization and Administration
Semester course; 3 lecture hours. 3 credits. A study of fundamental methods, routines, and procedures in the acquisition, preparation and circulation of books and other materials for libraries. Special emphasis is on the school library.

TEDU 597 Cataloging and Classification
Semester course; 3 lecture hours. 3 credits. A basic course in cataloging and classifying library materials. Practice is given in using classification systems, subject headings, filing rules and the use and adaptation of printed cards and cataloging aids.

TEDU 598 Media Center Development
Semester course; 3 lecture hours. 3 credits. The development and operation of a comprehensive library/media center requires a broad range of professional skills. This course will provide library/media professionals with knowledge and practice in the design and evaluation of media facilities and an understanding of the specific administrative supervision skills needed to operate a comprehensive library/media center.

TEDU 600 Organizing for Effective Classroom Instruction
Semester course; 3 lecture hours. 3 credits. For elementary and secondary teachers. Designed to assist teachers in becoming effective classroom organizers. Emphasis on the theory and application of instructional planning, behavior control, classroom
environment, instructional materials and teaching models.

TEDU 602 National Board Certification I
Semester course; 3 credits. Prerequisites: participation in a two-day Pre-candidacy Workshop and approval of department. Analyze and critique teaching practices, study national teaching standards, and develop initial portfolio entries.

TEDU 605 Theory and Practice of Educating Individuals with Special Needs
Semester course; 3 lecture hours. 3 credits. Not for certification or endorsement in special education. In-depth study of the past and current philosophies and approaches to serving students with special needs in educational settings. Attends to specific ways school services and classroom practices of general education teaching can assist in meeting these needs in today’s schools through mainstreaming and inclusion.

TEDU 611 Critical Investigations in Mathematics Education
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 522 or permission of instructor. A critical investigation of current and learning theories, instructional activities, programs and manipulative materials applicable to mathematics education in the elementary school. This offers an overview of the more prominent techniques and materials used to teach mathematics in elementary and middle schools. Students will undertake in-depth critical studies of alternative curricula, materials and strategies based on experience, learning theory and research findings.

TEDU 615 Curriculum Development
Semester course; 3 lecture hours. 3 credits. A basic graduate course in curriculum development. Curriculum decision making is examined in relation to foundation areas, content areas and current educational trends. Various conceptions of curriculum are explored.

TEDU 617 Instructional Models
Semester course; 3 credits. An examination of instructional methods with a focus on their analysis and adaptation to learning environments and school curriculum.

TEDU 618 Curriculum Construction
Semester course; 3-6 lecture hours. 3-6 credits. A study of curriculum problems with special attention given to the organization and preparation of teaching units. The course is individualized to meet student needs and nature of study.

TEDU 620 Designing Modular Instructional Packages
Semester course; 3 lecture hours. 3 credits. A study of the theory underlying simulation and instructional packages. Modular instructional packages will be developed with emphasis on their proper use as an instructional strategy.

TEDU 621 Curriculum Seminar
Semester course; 3 lecture hours. 3 credits. A study of curriculum theory, research, and practice for advanced students. The seminar is an opportunity for students to integrate previous study, conduct group work and present professional experiences in curriculum.

TEDU 622 Creative and Cognitive Development
Semester course; 3 lecture hours, 3 credits. Prerequisite: EDUS 603. Application of theories of creative and cognitive development in teaching.

TEDU 623 Child Study and Assessment in Early Childhood Education
Semester course; 3 lecture hours. 3 credits. Investigation and application of methods of observing, recording, and interpreting the behavior of young children. Review of criterion and norm-referenced measures for assessing capacities and needs in early childhood education as a basis for prescribing, providing appropriate activities.

TEDU 624 Early Childhood Education Programs and Policies
Semester course; 3 lecture hours. 3 credits. A study of Childhood Education paradigms including historical, federally funded and current center and home-based programs. A review of legislation, state and federal, that has affected ECE program development.

TEDU 625 Young Child and the Curriculum
Semester course; 3 lecture hours. 3 credits. Translation of curriculum development principles into appropriate curricular programs for young children. Impact of recent research on the organization of child development as related to planned activities and expected outcomes.

TEDU 626 Home-school Communication and Collaboration
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 414 or permission of instructor. Study in-home, methods, programs and current research of home-school partnerships, preschool through secondary education.

TEDU 627 Critical Investigations in Social Studies Education
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 591 or permission of instructor. Assumption of a knowledge of basic content and techniques in the teaching of social studies in elementary and middle schools, this course conducts a critical examination of various curricula and methodologies from the standpoint of current research, philosophical positions and relevant learning theory.

TEDU 630 Trends in Special Education
Semester course; 3 lecture hours. 3 credits. Overview of legislation and case law pertaining to special education, characteristics of individuals with exceptionalities, mainstreaming, inclusion, transition and classroom adaptations for educating these students in least restrictive environment.

TEDU 631 Behavior Management of Students with Disabilities
Semester course; 3 lecture hours. 3 credits. An in-depth analysis of behavioral models, research, strategies for managing behavior of students with various disabilities. Emphasis on developing, implementing and evaluating behavior management programs in special education programs.

TEDU 632 Secondary Programming for Students with Disabilities
Semester course; 3 lecture hours. 3 credits. Designed to provide knowledge of the special educator's role in working with students with disabilities for post-secondary educational and vocational environments. Emphasis is placed on designing and modifying high school curricula involving students and their families in transition planning and helping students acquire the services needed to be successful in adult life.

TEDU 636 Introduction to Supported Employment
Semester course; 3 lecture hours. 3 credits. This course is an overview of strategies for providing supported employment services to persons with severe disabilities. Emphasis is placed on job and contract development, job placement, job-site training and follow-along. Content is appropriate for use in specialized industrial training, mobile work crews, sheltered enclaves and supported competitive employment.

TEDU 637 Developing and Implementing Supported Employment Programs
Semester course; 3 lecture hours. 3 credits. This course focuses on the development of comprehensive supported employment programs at the agency or community level. Course content includes strategies for the management and operation of supported employment programs, procedures for program evaluation and methods for designing and implementing staff development programs.

TEDU 641 Independent Study
Semester course; 1-6 credits. May be repeated for a maximum of 9 credits. Determination of the amount of credit and permission of the instructor and department chair must be procured prior to registration. Cannot be used in place of existing courses. An individual study of a specialized issue or problem in education.

TEDU 648 Preparation of Instructional Materials
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 507 or permission of instructor. Development of materials for the classroom, including determining medium, designing the message, producing the material and evaluating the effect. The design of these materials will be predicated on the learning modes and instructional styles.

TEDU 649 Educational Media: Theory and Practice
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 507 or permission of instructor. An analysis of educational media with emphasis on the use of media in instructional design and development of teaching strategies.

TEDU 651 Topics in Education
Semester course; 1-3 credits. May be repeated for 9 credits. Check with department for specific prerequisites. A course for the examination of specialized issues, topics, readings or problems in education.

TEDU 672 Internship
Semester course; 1-6 credits. May be repeated for a maximum of 12 credits. Prerequisite: Permission of adviser. Study and integration of theory with practice in clinical or off-campus settings supervised by an approved professional and university faculty. May include seminars, selected readings, projects and other activities designed and evaluated by supervising faculty.

TEDU 680 Externship Proposal Seminar
Semester course; 3 lecture hours. 3 credits. Prerequisites: Enrolled in curriculum and instruction program. Approval of externship goals by faculty specialist. Develops and refines the skills applicable to the preparation of an acceptable draft of an externship proposal.
TEDU 681 Investigations and Trends in Teaching
Semester course; 3 credits. May be repeated for a maximum of 9 credits. A course designed to familiarize teachers and prospective teachers with recent trends and developments in course content, strategies for organizing learning experiences and in presenting course material in their classrooms. Laboratory experience may be incorporated where appropriate.

TEDU 682 Curriculum Development in Science Education
Semester course; 3 lecture hours. 3 credits. A course for science teacher-developed curriculum innovations that emphasize the initiation of formal and informal classroom work on current scientific trends, as well as special class work and laboratory programs.

TEDU 700 Externship
Semester course; 1-6 credits. May be repeated for a maximum of 9 credits. Prerequisite: Permission of department. Plan of work designed by extern with prior approval of the offering department. State certification or equivalent may be required for some externships. Off-campus planned experiences for advanced graduate students designed to extend professional competencies, carried out in a setting, under supervision of an approved professional. Externship activities monitored and evaluated by university faculty.

TEDU 702 National Board Certification II
Semester course; 3 credits. Prerequisite: Successful completion of TEDU 602 (grade of "A" or "B"). Apply advanced analysis and reflection on teaching practice, culminating in the completion of a portfolio that provides evidence of meeting national teaching standards.

TEDU 705 Seminar on Disability Policy
Semester course; 3 lecture hours. 3 credits. Discussion and examination of key federal and state issues that affect disability policy and program management. Includes an in-depth examination of IDEA, ADA and the Rehabilitation Act of 1973.

TEDU 706 Personnel Development in Special Education
Semester course; 3 lecture hours. 3 credits. Prepares individuals to effectively design, provide and evaluate personnel development programs that prepare professionals to maximize the developmental, educational, emotional and employment outcomes of individuals with disabilities.

TEDU 707 Critical Issues in Special Education
Semester course; 3 lecture hours. 3 credits. Discussion and examination of controversial and/or critical issues in special education, as well as current IDEA definitions (learning disabilities, emotional disturbance and mental retardation), referral and assessment methods, and instructional models.

TEDU 708 Designing, Funding and Conducting Research in Special Education
Semester course; 3 lecture hours. 3 credits. Provides an overview of the frameworks and major designs within three alternative research methodologies in special education: single-subject design, group design and qualitative methods as used in special education research. Addresses advanced research reviews, funding issues and professional writing aspects.

TEDU 709 Directed Readings in Special Education
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 9 credits. Analysis and discussion of topics specific to doctoral student's disability interest (e.g., learning disabilities, emotional disturbance, mental retardation, etc.).

TEDU 730 Educational Staff Development
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate standing and TEDU 617. This course cannot be used to meet a requirement for endorsement as a supervisor of instruction in Virginia. Provides educational leaders with the knowledge and skills necessary to design, implement and evaluate staff development programs that focus on instructional improvement. Includes the application of staff development as part of teacher evaluation systems.

TEDU 731 Instructional Theories and Strategies
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate standing and TEDU 617. Provides instructional leaders with the knowledge and competence necessary to apply and evaluate instructional strategies that are appropriate for students at all levels of schooling. The focus of the course will be on case studies, applications of principles, use of simulation and practical problem-solving approaches.

TEDU 798 Thesis
Semester course; 1-6 credits. May be repeated for a maximum of 6 credits. A research study of a topic or problem approved by the student's supervisory committee and completed in accordance with acceptable standards for thesis writing.
EGRB 507 Biomedical Electronics and Instrumentation
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Fundamental principles and applications of electronics and instrumentation as related to biomedical sciences.

EGRB 509 Microcomputer Technology in the Biomedical Sciences
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Microcomputer applications to the acquisition and manipulation of data in the biomedical laboratory.

EGRB 511 Fundamentals of Biomechanics
Semester course; 3 lecture hours. 3 credits. Prerequisites: Calculus and ordinary differential equations (MATH 200–201, MATH 301 or equivalent). Introduces basic mechanical properties of materials, describes methods of material testing and introduces techniques for analyzing the solid and fluid mechanics of the body. Considered topics such as stress/strain relationships, particle mechanics, and force balances.

EGRB 603 Biomedical Signal Processing
Semester course; 3 lecture hours. 3 credits. Prerequisites: Calculus and differential equations (MATH 300 or equivalent), including Laplace and Fourier Transforms. Explores theory and application of discrete-time signal processing techniques in biomedical data processing. Includes discrete-time signals and systems, the Discrete/Fast Fourier Transforms (DFT/FFT), digital filter design and implementation, and an introduction into processing of discrete-time random signals.

EGRB 610 Microprocessor Interfacing for Biomedical Instrumentation
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: EGRB 509 or permission of instructor. Principles and applications of microprocessor interfacing for biomedical instrumentation. Topics include microprocessor architecture, assembly language, programming and debugging techniques. EGRB 511 or permission of the instructor.

EGRB 611 Cardiovascular Dynamics
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 501 or PHYS 502. Analyzes and models the cardiovascular system in health and disease through studies on the properties of heart and vascular tissue, the mechanics of blood flow and the application of engineering methods to the diagnosis and treatment of cardiovascular pathologies.

EGRB 612 Structural Biomechanics
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRB 511. Treats mechanical functions of the human body as an engineering structure used to assist and supplement these functions. Includes movement of the musculoskeletal system, joint reaction forces, stresses and strains developed within bones, function and design of orthopedic braces and prosthetics, effect of vibration and impact on the body, mathematical and other models of the body.

EGRB 613 Biomaterials
Semester course; 3 lecture hours. 3 credits. Prerequisite: Undergraduate material science or permission of the instructor. Primary and secondary stress determination, properties of materials used for implants in the human body. Topics will include metallurgy of stainless steel, cobalt-chromium alloys, titanium alloys, biocompatibility of implant materials, mechanical and physical properties of biomaterials, corrosion of biomaterials and medical polymers.

EGRB 615 Medical Imaging
Semester course; 3 lecture hours. 3 credits. Prerequisite: Calculus and college physics. Covers the physical principles and techniques of medical imaging modalities such as ultrasound, X-ray and nuclear magnetic resonance. Provides an introduction to the field of medical imaging and its role in the diagnosis and treatment of diseases.

EGRB 635 Modeling for Biomedical Engineers
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Utilizes mathematical modeling techniques to biomedical systems. Covers linear and nonlinear systems, deterministic and random systems, large systems, ecosystems, numerical techniques, and computer programming approaches and simulation packages. Utilizes examples of biochemical, physiological and pharmacokinetic systems throughout.

EGRB 641 Survey of Molecular Modeling Methods
Semester course; lecture and laboratory hours. 1 credit. Introduces computational chemistry and molecular graphics with the current software used for drug design and small molecule/ligand/molecule interactions. Computational chemistry problems will be emphasized in the laboratory.

EGRB 670 Advanced Molecular Modeling Theory and Practice
Semester course; lecture and laboratory hours. 3 credits. Prerequisite: MDED 641, EGRB 641 or permission of the instructor. Examines the principles and applications of computational chemistry and molecular graphics to current problems in drug design. Focuses on the application of specific computational methods and techniques to solve problems in drug/molecular design. Workshop sessions provide hands-on experience using state-of-the-art hardware and software for molecular modeling.

EGRB 680-681 Research Orientation I-II
Semester course; 4 laboratory hours. 2 credits (nondidactic course) per semester. Research rotation through the biomedical engineering core and selected affiliate laboratories.

EGRB 690 Biomedical Engineering Research Seminar
Semester course; 1 lecture hour. 1 credit. Presentation and discussion of research reports and topics of interest to the program seminar or special group seminar.

EGRB 691 Special Topics in Biomedical Engineering
Semester course; 1-4 credits. Lectures, tutorial studies, library assignments in selected areas of advance study, or specialized laboratory procedures not available in other courses or as part of the research training.

EGRB 697 Directed Research in Biomedical Engineering
Semester course; 1-15 credits. Research leading to the M.S. degree or elective research projects for other students.

EGRC 543 Advanced Reaction Engineering
Seminar course; 3 lecture hours. 3 credits. Provides the fundamental background needed to effectively design reactors at the macroscale exemplified by batch, pilot and plant operations or at the micro- and nano-scale exemplified by the current trend to miniaturize unit operations. A quantitative analysis is developed to explain why "real" reactor performance departs from ideal batch, CSTR and plug flow reactor performance.

EGRC 544 Applied Transport Phenomena
Semester course; 3 lecture hours. 3 credits. Provides the basis for analyzing mass, energy and momentum transport issues in environmental, chemical, biological and industrial processes. Deals with multicomponent mixtures.

EGRC 549 Process Biotechnology
Semester course; 3 lecture hours. 3 credits. Designed to provide a rational basis for analyzing engineering challenges in the emerging biotechnology area. The course material is broad in scope covering biochemical synthesis, bioreactor design and bioprocess monitoring and control. It also deals with important issues associated with separation and purification techniques used with biomaterials.

EGRC 554 Molecular Thermodynamics for Engineers
Seminar course; 3 lecture hours. 3 credits. Provides the molecular-based background needed to apply thermodynamic principles to a broad range of process technologies. Designed for chemical and biochemical engineering students.

EGRC 645 Biosensors and Bioelectronic Devices
Seminar course; 3 lecture hours. 3 credits. Provides the fundamental background in the basic principles of biosensors and bioelectronic devices to monitoring problems in the environmental, medical and chemical industries. Provides the knowledge and principles to design and apply biosensors to real-world problems associated with the measurement of concentration of chemical and biological species. Topics include the basic principles of biosensors, the design and application of biosensors in environmental, medical and chemical industries.
Computer Science

CMSC 502 Parallel Programming
Semester course; 3 lecture hours. 3 credits.
Prerequisites: CMSC 312 and CMSC 401. Software and hardware mechanisms for providing mutual exclusion in uniprocessor and multiprocessor environments. Architectures of multiprocessor systems and metrics for their evaluation. Design and uses of parallel algorithms to solve concurrency problems in a distributed environment including message passing and remote procedure calls. Students will work in teams to design and implement parallel algorithms.

CMSC 504 Compiler Construction
Semester course; 3 lecture hours. 3 credits.
Prerequisites: CMSC 401 and CMSC 403. Review of programming language structures, translation, loading, execution and storage allocation. Compilation of simple expressions and statements. Organization of a compiler. Use of bootstrapping and compiler writing languages.

CMSC 505 Computer Architecture
Semester course; 3 lecture hours. 3 credits.
Prerequisites: CMSC 301 with a grade of "C" or better and CMSC 511. Basic digital circuits combinational logic, data transfer and digital arithmetic. Memory and memory access, control functions, CPU organization, microprogramming, input/output interfaces.

CMSC 506/ENGR 526 Computer Networks and Communication Systems
Semester course; 3 lecture hours. 3 credits.
Prerequisite: CMSC 312. Theoretical and applied analysis of basic data communication systems; design of networks in the framework of the OSI reference model; Local and Wide Area Networks; performance analysis of networks; error control and security. Students will work in teams to design and implement a small computer network.

CMSC 508 Database Theory
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 401. Design and implementation of relational database systems. Emphasis is placed on entity-relationship diagrams, relational algebra, normal forms and normalization. Introduction to SQL. Discussion of physical level issues. Brief discussion of alternative database models such as the object-oriented, hierarchical and network models. Students will be required to complete a design project and give an oral presentation of the project.

CMSC 509 Artificial Intelligence
Semester course; 3 lecture hours. 3 credits. Prereq: CMSC 401 and CMSC 403. Problem spaces, problem-solving methods, game playing, knowledge representations, expert systems, natural language understanding.

CMSC 511 Computer Graphics
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 401 and MATH 310. Presents mathematical techniques for picture development and transformation, curve and surface approximation and projections, graphical languages and data structures and their implementation, graphical systems (hardware and software).

CMSC 519 Software Engineering: Specification and Design
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 256 and CMSC 301, both with a grade of "C" or better, and CMSC 355. Overview of the software engineering process and software life cycle models. Detailed study of planning, analysis, design and implementation phases. Students will work in teams to gain experience in prototyping and in developing specification and design documents and user documentation.

CMSC 520 Software Engineering Practicum
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 401 and CMSC 519. Students participate as part of a team in the detailed design, implementation and evaluation of a software system.

CMSC 521 Introduction to the Theory of Computation
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 301 or the equivalent with a grade of "C" or better. An introduction to automata theory, formal languages and computability. Topics include finite automata, pushdown automata, Turing machines, decidability and computational complexity.

CMSC 525 Introduction to Software Analysis, Testing and Verification
Semester course; 3 credits. Prerequisites: CMSC 401 and CMSC 403. An introduction to concepts and techniques used in the analysis of software for certain properties. Using analytic results to derive test data and verify the correct implementation of programs. Flow graphs, fault/failure model, theoretical and practical limitations. Control-flows, data flow and error flow analyses. Testing strategies including random, structural, mutation and error flow. Software metrics.

CMSC 526 Theory of Programming Languages
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 401 and CMSC 403. An introduction to the formal semantics of programming languages, logic programming and functional programming. Topics include denotational semantics, attribute grammars, Backus Formal Functional Programming, fixed point semantics, model-theoretic semantics and PROLOG.

CMSC 591 Topics in Computer Science
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisites: At least one graduate-level computer science course, consent of the instructor and approval of the student's advisor. Selected topics in computer science such as: Theory of data bases, information retrieval and artificial intelligence.

CMSC 602 Operating Systems
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 502. A study of operating systems including those in multiprocessor and distributed environments. I/O programming, resource management (including processor and memory management), security and system performance evaluation.

CMSC 605/ENGR 635 Advanced Computer Architecture
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 505 or ENGR 426, or consent of instructor. This course will focus on the design and analysis of high performance computer architectures. Topics investigated include: processor design, superscalar computers, multiprocessors, memory systems, peripherals, interfacing techniques, networks, performance and software issues.

CMSC 608 Advanced Database
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 508. Topics discussed include: handling of missing information; the relationship between nested relations, relational algebra and SQL; logic databases; distributed databases; outer joins; and transaction processing. Emphasis is placed on theoretical issues involved in these topics.

CMSC 611 Advanced Computer Graphics
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 511. Modeling, representation of three-dimensional (3-D) shapes, displaying depth relationships, algorithms for removing hidden edges and surfaces, color, shading models, and intensity.

CMSC 619 The Design and Specifications of User Interfaces
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing and permission. Emphasizes knowledge of first order predicate calculus and context-free languages. Focuses on human-computer interface design principles and methodology and formal specifications of user interfaces.

CMSC 621 Theory of Computation
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 525. Studies the concepts and techniques used in the analysis of software and the derivation of test data. Focuses on software metrics and reliability; construction of tools to aid software analysis and testing. Requires students to review seminal and current papers from the literature, and lead their discussion in class.

CMSC 625 Special Topics in Computer Science
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 525. Studies the complexity and computability of problems and programs. Topics will include unsolvability, universal programs and abstract complexity.

CMSC 625 Advanced Software Analysis, Testing and Verification
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 525. Studies the concepts and techniques used in the analysis of software and the derivation of test data. Focuses on software metrics and reliability; construction of tools to aid software analysis and testing. Requires students to review seminal and current papers from the literature, and lead their discussion in class.

CMSC 691 Special Topics in Computer Science
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisites: At least one graduate-level computer science course, consent of the instructor, and approval of the student's advisor. Selected topics in computer science such as: Theory of data bases, information retrieval and artificial intelligence.

CMSC 697 Directed Research
Semester course; 3 lecture hours. 3 credits. Independent research done under the supervision of a faculty member. The student must identify a faculty member to supervise the research and submit a proposal for approval by the computer science graduate committee no later than the 10th week of the prior semester. A written report and an oral presentation are required upon completion of the research project. At most, three credits of CMSC 697 can be applied toward the M.S. degree.

CMSC 698 Thesis
Hours to be arranged. 1-3 credits. May be repeated for credit. A total of 3 or 6 credits may be applied to the M.S. in Applied Mathematics or to the M.S. in Mathematics (a total of 3 credits for a master's thesis or a total of 6 credits for a research thesis). Prerequisite: Graduate standing. Independent research culminating in the writing of the required thesis. The student must identify
a faculty member willing to supervise the research and submit a proposal to the computer science graduate committee no later than the 10th week of the prior semester. This proposal must be approved before the student can register for the course. Grade of “S,” “U” or “F” may be assigned in this course.

**Electrical Engineering**

**EGRE 520** Semiconductor and Quantum Electrics  
Semester course; 3 lecture hours. 3 credits. Dedicated to electronic structures, band structure calculations, optical absorption and emission, lasing in semiconductors, electron photon interactions, surface states, scaled MOS transistors and heterojunction bipolar transistors.

**EGRE 521** Advanced Semiconductor Devices  
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 303, PHYS 420 and 440, or equivalents. Design and implementation of semiconductor devices, defects, interfaces, heterojunctions, metal-semiconductor contacts, metal-oxide-semiconductor structures, device characterization, and semiconductor micro-fabrication processes can be combined to make miniature versions of these systems or make entirely new systems.

**EGRE 525** Fundamentals of Photonics Engineering  
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 303, 309 and 310 or equivalents. Theoretical and observed properties of materials and their use in implementing digital logic. Implementation and layout of simple and complex digital logic cells using CMOS and other techniques. Fabrication design rules and technology, VLSI chip layout and implementation. Students will design a complete VLSI chip using commercial design tools. The resulting designs will be submitted for fabrication using the MOSIS process.

**EGRE 535** Digital Signal Processing  
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisite: EGRE 307 or consent of instructor. This course focuses on digital signal processing theory and algorithms, including sampling theorems, transform analysis and filter design techniques. Discrete-time signals and systems, and filter design techniques are treated. Several applications of DSP in telecommunications, image and video processing, and speech and audio processing are studied.

**EGRE 555/MATH 555 Dynamics and Multivariable Control I**  
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 301 and 310 or the equivalent. Systems of differential equations, controllability, observability, introduction to feedback control and stabilization.

**EGRE 623** Nanostructures and Nanodevices  
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 303, PHYS 420 and 440, or equivalents. The course focuses on how a variety of different micro- and nanostructures can be combined in order to make miniature versions of these systems or make entirely new systems.

**EGRE 630** Neural Networks  
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Introduces students to the fundamental theory, design and applications of neural networks. Topologies will include network architectures, the learning process, types of learning, single layer perceptrons, multilayer perceptrons and neural network applications.

**EGRE 631** Embedded Systems  
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 426 and 427 or equivalents. Presents advanced material in the area of the design, implementation and testing of embedded computer systems intended to operate as part of a larger system. Topics to be discussed include: specification and performance modeling, hardware/software partitioning and architecture, software co-design, hardware synthesis, implementation technologies such as ASICs and FPGAs, dependability analysis and the design of dependable systems, production testing and cost analysis for the design of digital systems. A large scale design project that will make extensive use of commercial EDA tools and the VHDL language will be included in the course.

**EGRE 633** Advanced VLSI Systems Design  
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 505 or EGRE 426, or consent of instructor. This course will focus on the design and analysis of high performance computer architectures. Topics investigated include: pipeline design, superscalar computers, multithreaded systems, peripherals, interfacing techniques, networks, performance and software issues.

**EGRE 655/MATH 655 Dynamics and Multivariable Control II**  
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 505 or EGRE 426, or consent of instructor. Control problems for nonlinear systems of ordinary differential equations, methods of feedback control to achieve control objectives.

**Engineering**

**ENGR 501** Advanced Manufacturing Systems  
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRM 425 and 426, or consent of instructor. This course will focus on advanced material in the area of the design, implementation and testing of embedded computer systems intended to operate as part of a larger system. Topics to be discussed include: specification and performance modeling, hardware/software partitioning and architecture, software co-design, hardware synthesis, implementation technologies such as ASICs and FPGAs, dependability analysis and the design of dependable systems, production testing and cost analysis for the design of digital systems. A large scale design project that will make extensive use of commercial EDA tools and the VHDL language will be included in the course.

**ENGR 502** Product Design and Development  
Semester course; 3 lecture hours. 3 credits. Prerequisites: Admission to engineering graduate school and/or permission of instructor. Presents engineering concepts and techniques necessary to successfully develop new products and introduce them to the marketplace. Topics include development processes, converting direct customer input to marketing specifications, creating technical specifications, quantifying customer input, using rapid prototyping to reduce development time, design for manufacturability and product certification issues.

**ENGR 505** Characterization of Materials  
Semester course; 3 lecture hours. 3 credits. Focuses on characterization techniques of solids at the molecular, surface and bulk levels, including resonant, vibrational and electronic spectroscopies, X-ray methods and optical and electron microscopies. A connection will be developed between the theoretically-derived and experimentally-observed properties of materials and a
rationale also will be developed for choosing an appropriate characterization technique for a given material.

**ENGR 565 Design Optimization**  
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENGR 420 and 421 or equivalent or permission of instructor. Focuses on providing students with a methodology and set of skills to apply in improving engineering components, systems and processes. The design of better products and processes is a fundamental goal of all engineering.

**ENGR 591 Special Topics in Engineering**  
Semester course; 1-4 credits. Lectures, tutorial studies, library assignments in selected areas of advanced study or specialized laboratory procedures not available in other courses or as part of research training.

**ENGR 690 Engineering Research Seminar**  
Semester course; 1 credit. May be repeated for a maximum of 2 credits. Presentations and discussion of current problems and developments in engineering by students, staff and visiting lecturers.

**ENGR 691 Special Topics in Engineering**  
Semester course; 1-4 credits. Prerequisites: At least one graduate-level engineering course and permission of instructor. An advanced study of selected topic(s) in engineering. See the Schedule of Classes for specific topics to be offered each semester.

**ENGR 692 Independent Study**  
Semester course; 1-3 lecture and 1-3 laboratory hours. 1-3 credits. Prerequisites: Graduate standing and consent of instructor. The student must identify a faculty member willing to supervise the course and submit a proposal for approval to the appropriate track's graduate committee. Investigation of specialized engineering problems through literature search, mathematical analysis, computer simulation and/or experimentation. Written and oral reports, final report and examination are required.

**ENGR 697 Directed Research**  
1-9 credits. Research directed towards completion of the requirements for M.S. and Ph.D. Engineering degrees under the direction of engineering faculty and an advisory committee.

### Mechanical Engineering

**EGRM 561 Advanced Fluid Mechanics**  
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENGR 301, 302, 304 and computer programming or equivalent or permission of instructor. Covers the principles necessary to analyze viscous flow. Students learn how to formulate solutions to general viscous flow problems.

**EGRM 566 Advanced Computer-aided Design and Manufacturing**  
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENGR 420, 421, 425, 426 or equivalents or permission of instructor. Provides students with an understanding of how modern computer techniques can enhance the generation, analysis, synthesis, manufacturing and quality of engineering products. The design and manufacture of better products and processes is a fundamental goal of all engineering disciplines.

**EGRM 568 Robot Manipulators**  
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGR 427 or permission of instructor. Provides students with a basic knowledge in the dynamic analysis and control of robot manipulators. Topics include Jacobian analysis, manipulator dynamics, linear and nonlinear control of manipulators, force control of manipulators, robot manipulator applications and an introduction to telemanipulation.

**EGRM 573 Engineering Acoustics**  
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate standing or permission of instructor. Designed to equip students to perform design work, testing and research in structural acoustics and vibrations. Applications from the fields of automotive, aerospace, marine, architectural, medical equipment and consumer appliance industries will be investigated.

**EGRM 661 Computational Fluid Dynamics**  
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENGR 561 or equivalent or permission of instructor. Teaches students how to perform two- and three-dimensional fluid flow and heat transfer analyses. Students will be able to understand and use most of the commercial flow analyses applied in industry today.

**EGRM 662 Advanced Turbomachinery Systems**  
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENGR 561 and 661 or permission of instructor. Teaches students the principles used in analyzing/designing compressors and turbines. Students will be expected to design a gas turbine to meet specific mission requirements. Upon completion of the course, students will be able to understand the design systems and techniques used in the aeropropulsion and gas turbine industries.
Anatomy

ANAT 301 Head and Neck Anatomy for Dental Hygienists
Semester course; 2 lecture and 1 laboratory hours. 3 credits. Prerequisite: Admission will to the Dental Hygiene Program. An overview of head and neck anatomy that examines the major osteological, neural, muscular, vascular and visceral features. Lectures will be supplemented by textbook, self-study packages and by brief laboratory exercises that provide hands-on exposure to these major anatomical features.

ANAT 302 Microscopic Anatomy (Dental Hygiene)
Semester course; 2 lecture and 2 laboratory hours. 3 credits. A lecture course in the microscopic anatomy of general body tissues and the oral cavity.

ANAT 501 Gross Anatomy (Dentistry)
Semester course; 5.5 lecture and 8 laboratory hours. 7 credits. A systematic dissection and study of the human body with clinical correlation and emphasis on the head and neck.

ANAT 502 Microscopic Anatomy (Dentistry)
Semester course; 3 lecture and 6 laboratory hours. 6 credits. A study of the normal tissues and organs of the human body at the microscopic level, with emphasis on the histological organization and development of the oral cavity.

ANAT 503 Neuroanatomy (Dentistry)
Semester course; 1.5 lecture hours. 1.5 credits. This course provides the student with a broad exposure to the field of neuroanatomy. The structure and connections of the brain and spinal cord are stressed to prepare the student for dealing with physiological, pharmacological, and clinical aspects presented in other courses.

ANAT 505 Principles of Human Anatomy (Pharmacy)
Semester course; 2.5 lecture and 1 laboratory hours. 3 credits. The structure of the human body is surveyed by studying micro-, neuro-, and gross anatomy. Emphasis is placed on basic concepts and their application to various body components.

ANAT 509/PHIS 509/PHTX 509/NEUS 509 Cellular and Molecular Neuroscience
Semester course; 4 lecture hours. 4 credits. Prerequisite: Permission of instructor. Designed as an interdisciplinary introduction to the cellular and molecular aspects of central nervous system function. The basic principles of neuroscience including neuronal structure and function, neurotransmitters, and cell biology of neurotransmitter release and postsynaptic function will be discussed, followed by intracellular signaling in neurons, gene regulation, transgenic model systems, glia, neuronal development, basic neurochemistry, and molecular and cellular aspects of motor, sensory and integrative function. The course will conclude with lectures on various aspects of neural injury and disease, including traumatic brain injury, Parkinson's and Alzheimer's diseases.

ANAT 525 Advanced Functional Anatomy (Occupational Therapy)
Semester course; 3 lecture and 4 laboratory hours. 5 credits. Prerequisites: BIOL 205 or equivalent and permission of the instructor. A study of the anatomy and kinesiology of the human body using prosected specimens and the dissected cadaver. Emphasis is placed on the study of the extremities, particularly the hand.

ANAT 529 Functional Neuroanatomy
Semester course; 4 lecture and 10 laboratory hours. 9 credits. A dissection and macroscopic study of the human body, with clinical correlations.

ANAT 610 Neuroanatomy
Semester course; 4 lecture and 2 laboratory hours. 5 credits. A study of the structure, connections and function of the central nervous system. Laboratory sessions complement lecture presentations, emphasizing light microscopic and ultrastructural neurohistology, gross and sectional anatomy of the brain, and tracing of functionally related CNS connections.

ANAT 611 Histology
Semester course; 4 lecture and 2 laboratory hours. 5 credits. A study of the anatomy and physiology of single tissues and organs of the human body at the microscopic level, with emphasis on the histological organization and development of the oral cavity.

ANAT 613 Advanced Studies in Anatomy
Semester course; 4 lecture and 2 laboratory hours. 5 credits. A study of the structure, connections and function of the central nervous system. Laboratory sessions complement lecture presentations, emphasizing light microscopic and ultrastructural neurohistology, gross and sectional anatomy of the brain, and tracing of functionally related CNS connections.

ANAT 615 Topics in Cell Biology
Semester course; 2 lecture hours. 2 credits. A topical approach to current areas of interest in mammalian cell and molecular biology.

ANAT 690 Anatomy Research Seminar
1 lecture hour. 1 credit. A course consisting of faculty and student-led seminars presenting current research in neurobiology, immunobiology, and reproductive biology.

ANAT 691 Special Topics in Anatomy
1-4 credits. Lectures, seminars, tutorial sessions, and/or library research assignments in selected areas of advanced study not available in other graduate level anatomy courses, or as an elective at the instructor's discretion.

ANAT 697 Directed Research in Anatomy
1-15 credits. Research leading to the M.S. or Ph.D. degree and elective research projects for other students.

Biochemistry and Molecular Biophysics

BIOC 403/CHEM 403 Biochemistry
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 101-102, CHEZ/FRSZ 101L, 102L and CHEM 301-302, or equivalents with permission of instructor. A presentation of structural biochemistry, enzymology, biophysical techniques, bioenergetics and an introduction to intermediary metabolism.

BIOC 404/CHEM 404 Advanced Topics in Biochemistry
Semester course; 2 lecture hours. 2 credits. Prerequisites: CHEM 101-102, CHEZ/FRSZ 101L, 102L and CHEM 301-302, and CHEM/ BIOC 403, or equivalents with permission of instructor. Presentations of cellular, molecular and structural aspects of biochemistry. Selected topics of biomedical research.

BIOC 501 Biochemistry (Dentistry)
Semester course; 5 lecture hours plus clinical correlations. 3 credits. Prerequisite: Organic chemistry, three credits of physical chemistry, or permission of instructor. A presentation of structural biochemistry, intermediary metabolism, physiological chemistry, and nutrition as part of the fundamental background of modern dentistry. Four clinical correlation workshops complement the lecture presentations.

BIOC 502 Biochemistry (Medicine)
Semester course; 3 lecture hours. 3 credits. Enrolment restricted to students accepted in the School of Medicine. An introduction of structural biochemistry, intermediary metabolism, cell biology and methods of biochemical analysis as part of the fundamental background of modern medicine.

BIOC 503-504/MICR 503-504 Biochemistry, Cell and Molecular Biology
Continuous courses; 5 lecture hours. 5 credits. Prerequisites: undergraduate organic and physical chemistry, or permission of instructor. A comprehensive introductory course that describes basic biochemistry and reviews current concepts of modern cell and molecular biology.

BIOC 505-506 Experimental Biochemistry
Continuous courses; 4 laboratory hours. 2 credits. Prerequisite: BIOC 503 (or concurrent) or equivalent and permission of instructor. A presentation of cellular, molecular and structural aspects of biochemistry. Laboratory work, including theory and practice of advanced biochemical research methods.

BIOC 507-508 Bioorganic Chemistry
Continuous courses; 3 lecture hours. 3 credits. Prerequisite: Permission of the instructor. Study of structure, chemistry, and mechanism of small, biologically important molecules.

BIOC 509 Biophysical Chemistry
Semester course; 3 lecture hours. 2 credits. Study of major physical/chemical concepts of biological organization with emphasis on self-assembly and dynamic interactions of biological structures.

BIOC 510 Radiation Safety
Semester course; 15 lecture hours. 1 credit. Provides basic principles for the safe use of radioactive materials in biological research and meets the minimum training requirements set forth for responsible investigators in the university’s Radiation Safety Programs. Offered on a demand basis (2-4 times or approximately 20 students per year).
BIOC 516C Human Nutrition
Semester course; 3 lecture hours. 3 credits. This off-campus survey course is designed for secondary school health and physical education teachers as well as others who wish to expand their knowledge of nutrition. The course involves core as well as current issues in human nutrition and primarily involves a series of interdisciplinary lecture/discussions. Topics include: description of the biochemistry and physiology of food components and nutrients; the accepted recommendations to health, nutrition and exercise, physical fitness and athletic performance; as well as topics related to eating disorders; growth and development; nutrition misinformation; nutrition and health issues.

BIOC 523-524 Biochemistry (Pharmacy)
Continuous courses; 2-3 lecture hours. 2-3 credits. Prerequisites: CHEM 301-302 or equivalent. A presentation of structural biochemistry, intermediary metabolism, physiological chemistry, and nutrition as a part of the fundamental background of pharmacy.

BIOC 550 Basic Science Core Curriculum for Postgraduate Dental Students
Semester course; 3 lecture hours. 3 credits. This course is designed to provide the postgraduate dental student with the educational experience in the basic science required for the successful completion of his or her specialty training program. Selected lectures in the basic science areas related to dentistry are presented and are supplemented by assigned articles.

BIOC 601 Membranes and Lipids
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOC 503-504. Comprehensive presentation of important areas in biological membrane research. Key topics include techniques in the study of membrane lipids and proteins, "order" and organization in membranes, transport, receptors and cell surface antigens, physical measurements in membranes, reconstituted systems, and signal transduction.

BIOC 602 Physical Properties of Macromolecules
Semester course; 3 lecture hours. 2-4 credits. Prerequisite: BIOC 503-504 and physical chemistry. Structure of macromolecular components and macromolecules; biophysical approaches to the determination of structure.

BIOC 604 Enzymology
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOC 503-504. Physical and chemical properties and mechanisms of action of enzymes. Treatment of chemical catalysis, enzyme kinetics, and correlation of enzyme structure to mechanisms.

BIOC 605 Molecular Biology
Semester course; 3 lecture hours. 3 credits. Prerequisite: Undergraduate chemistry or biochemistry. An advanced course on molecular biology, recombinant DNA, transcription, RNA processing, control of gene expression, translation, cell cycle, oncogenes and tumor suppressors, viral vectors, and gene therapy.

BIOC 606 Biochemical Control Processes
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOC 503-504 and permission of instructor. An advanced course on aspects of control mechanisms and cellular communication: current concepts of signal transduction.

BIOC 610 Current Trends in Biochemistry
Semester course; 2 lecture hours. 2 credits. Prerequisites: BIOC 503-504. A study and literature review of common and complex biochemical substances using recent research methodology.

BIOC 690 Biochemistry Seminar
Semester course; 1 credit. Reports on recent biochemical literature and research by students and staff.

BIOC 691 Special Topics in Biochemistry
Semester course; 1-4 credits. Lectures, tutorial studies and/or special assignments in selected areas of advanced study not available in other courses or as part of research training.

BIOC 697 Directed Research in Biochemistry
Semester course; 1-15 credits. Research leading to the M.S. or Ph.D. degree and elective research projects for other students.

Biostatistics

BIOC 513-514/STAT 513-514 Mathematical Statistics I-II
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: MATH 307. Probability, random variables and their properties, distributions, moment generating functions, limit theorems, estimators and their properties; Neyman-Pearson and likelihood ratio criteria for testing hypotheses.

BIOC 516 Biostatistical Consulting
Semester course; 1 lecture hour. 1 credit. The principles dealing with the basic art and concepts of consulting in biostatistics. The nonstatistical course discusses role, responsibilities of biostatisticians, relationship between clients and consultants, method of writing reports, etc.

BIOC 523/STAT 523 Nonparametric Statistical Methods
Semester course; 3 lecture hours. 3 credits. Prerequisite: Any two courses of statistics or permission of instructor. Estimation and hypothesis testing when the form of the underlying distribution is unknown. One- and two- and k-sample problems. Tests of randomness, Kolmogorov-Smirnov tests, analysis of contingency tables and coefficients of association.

BIOC 524 Biostatistical Computing
Semester course; 3 lecture hours. 3 credits. Prerequisite: Any two courses of statistics. The Statistical Analysis System (SAS) is both a powerful computer language and a large collection of statistical procedures. Students learn how to create and manage computer data files. Techniques for thorough examination and validation of research data are presented as part of a complete, computerized analysis. Descriptive statistics are computed and statistical procedures such as t-tests, contingency tables, correlation, regression, and analysis of variance then applied to the data. Special attention is paid to the use of each procedure. Students are encouraged to analyze their own or typical data from their discipline.

BIOC 530 Elements of Biometry
Semester course; 5 lecture hours weekly during January and February. 2 credits. For dental and medical fellows; graduate students with consent. Concepts of biostatistics and epidemiology. Summary statistics and tables. Normal distribution and statistical association. Chi-square tests, t-tests for one and two-sample problems, and other tests. Sensitivity, specificity, odds ratios, and related topics. Clinical trials, retrospective and prospective studies, and other miscellaneous topics in biostatistics and epidemiology.

BIOS 531 Clinical Epidemiology
Semester course; 3 lecture hours. 3 credits. This course is intended primarily for clinicians. Permission of the course coordinator is required for others interested in registering. Methodological concepts and evidence based studies of medicine. Specific topics will include: cause and effect criteria, demographic rates, measures of association or effect, study designs, decision trees, meta-analysis, evaluation of the literature, sources of data, reliability and validity, bias, confounding and effect modification, screening and diagnostic tests, sensitivity, specificity, false positives, false negatives, applications of the above to diagnosis and treatment, treatment efficacy and improved patient care.

BIOS 543/PMCH 543/STAT 543 Statistical Methods II
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing, or one course in statistics and permission of instructor. Basic concepts and techniques of statistical methods, including: the collection and display of information, data analysis, and statistical measures; variation, sampling, and sampling distributions; point estimation, confidence intervals, and hypothesis testing for one and two sample problems; principles of one-factor experimental design, one-way analysis of variance, and multiple comparisons; correlation and simple linear regression analysis; contingency tables and tests for goodness of fit. Students may not receive degree credit for both STAT 541 and STAT 543. STAT 543 is not applicable toward the M.S. degree in mathematical sciences or the M.S. degree in computer science.

BIOS 544/STAT 544 Statistical Methods II
Semester course; 3 lecture hours. 3 credits. Prerequisite: One of the following: STAT 314, 543, 544 or equivalent. Advanced treatment of the design of experiments and the statistical analysis of experimental data using analysis of variance (ANOVA) and multiple-regression. Includes the use of a statistical software package for data analysis.

BIOS 546 Linear Models
Semester course; 3 lecture hours. 3 credits. Prerequisite: One of the following: STAT 314, 543, 544 or equivalent. Advanced treatment of linear models. Includes the use of a statistical software package for data analysis.

BIOS 553-554 Applied Statistics
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: MATH 200-201 or equivalent, one course in statistics. An introduction to biostatistics intended primarily for graduate students in the Department of Biostatistics. Reviews elementary probability, theory and frequency distributions, sampling theory, principles of inference, one and two sample problems. ANOVA. Principles of experimental design. Variance components. Multiple comparison procedures. Block designs and Latin Squares. Nested ANOVA. Multway ANOVA. Correlation and regression analysis.
Multiple regression. Nonlinear regression. ANCOVA. MANOVA. Repeated measures.

BIOS 571 Clinical Trials
Semester course; 3 lecture hours. 3 credits. Concepts of data management and statistical design and analysis in single-center and multicenter clinical trials. Data management topics include the collection, edition, and validation of data. Statistical design topics include randomization, stratification, blinding, placebo- and active-control groups, parallel and crossover designs, and power and sample size calculations. Statistical analysis topics include sequential and group sequential methods.

BIOS 572 Statistical Analysis of Biomedical Data
Semester course; 3 lecture hours. 3 credits. Statistical methodology for data sets frequently encountered in biomedical experiments. Topics include analysis of rates and proportions, epidemiological indices, frequency data, contingency tables, logistic regression, life-tables and survival analysis.

BIOS 581 Applied Multivariate Analysis
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 554. Focuses on multivariate statistical methods, including Hotelling's T-square, MANOVA, multivariate multiple regression, canonical correlation, discriminant analysis, partially and blocking, multivariate outliers, components and factor analysis, and GAMANOVA. Presumes the material in BIOS 543-544 or BIOS 553-554, including a matrix approach to multiple regression.

BIOS 615-616 Advanced Inference
Continuous courses; 4 lecture hours. 4 credits. Prerequisites: BIOS 514 and MATH 508, or permission of instructor. Mathematical preliminaries: probability and measure; integration; modes of convergence. Decision theoretical approach to statistical inference; decision rules; admissibility. Bayes and minimax prariance; complete classes. Point estimation; unbiasedness; efficiency; M, L, and R estimators; U statistics. Hypothesis testing: the Neyman-Pearson theory; unbiasedness and invariant tests; conditional tests; permutation tests; rank tests; likelihood based tests. Interval estimation; confidence sets; relationship between confidence sets and families of tests; unbiased and invariant confidence sets. Asymptotics; stochastic convergence; statistical limit theorems; ARE; asymptotic likelihood based procedures. Overview of robust statistical procedures.

BIOS 625 Analysis of Categorical Data
Semester course; 4 lecture hours. 4 credits. Prerequisites: BIOS 514, 545 and 572. Introduction to the theory and methods of analysis of binomial and multinomial data. Topics include exact and asymptotic analysis of contingency tables; measures of association and agreement; modeling approaches including logistic regression, loglinear models, logrank models, MANOVA, GMANOVA, and multiple design models, nonparametric methods; inference with covariance matrices; principal components; factor analysis; discriminant analysis; clustering; multidimensional scaling.

BIOS 631-632 Multivariate Analysis
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: BIOS 514, 546, and 544. Introduction to the theory and methods of multivariate analysis; distributions; partial, multiple, and economical correlations; maximum likelihood and decision theoretical estimation; one- and two-sample tests; invariance: MANOVA, GMANOVA, and multiple design models, nonparametric methods; inference with covariance matrices; principal components; factor analysis; discriminant analysis; clustering; multidimensional scaling.

BIOS 638-639 Statistical Design and Analysis in Toxicology
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites for BIOS students: BIOS 514 and 554. Prerequisite for non-biostatistics students (who can enroll on a Pass/Fail basis): BIOS 554. Classical bioassay, dose-response relationships, continuous and quantal data; power and sample size analysis; estimation of the ED50; combination experiments; low dose extrapolation and risk assessment; carcinogenicity, mutagenicity, and teratogenicity screening; overview of laboratory and experimental problems for the toxicologist. Non-biostatistics students may enroll on a pass/fail basis.

BIOS 647 Survival Analysis
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 514 and 554. The analysis of survival (or failure) data, with/without censored data. Actuarial and life-table methods, nonparametric and parametric estimation of survival functions, and comparison of survival curves; regression methods, such as the Cox proportional hazards model; competing risks; sequential models; applications to clinical trails.

BIOS 650 Design and Analysis of Response Surface Experiments
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 546 and 554. Philosophy, terminology, and nomenclature for response surface methodology, analysis in the vicinity of the stationary point, canonical ames, description of the response surfaces, rotatability, uniform information designs, central composite in design, and modern design criteria.

BIOS 655 Quantitative Epidemiology
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 545 and 572. Examines the quantitative aspects of epidemiological research. Includes causality in epidemiological research; the design, analysis, and interpretation of cohort and case-control studies; bias, confounding, and missclassification, matching, stratification, and adjusting of covariates; generalized linear models in epidemiological research, goodness-of-fit tests, and goodness-of-link tests.

BIOS 660 Sequential Analysis and Advanced Design and Analysis of Clinical Trials
3 lecture hours. 3 credits. Prerequisites: BIOS 514 and 554. Sequential methods versus fixed sample methods; the sequential probability ratio test with extensions and modifications; some applications of Cox's theorem; overview of clinical trials; closed and truncated tests; group sequential tests in clinical trials; sequential monitoring; sequential estimation; other topics with emphasis in clinical trials.

BIOS 667 Advanced Data Analysis
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 514 and 554. Explores recently developed data analysis techniques to find the main features and underlying structure of data. Includes robust methods, bootstrap, linear model diagnostics, cross validation, nonparametric regression, optimal transformation, ACE algorithm, projection pursuit regression.

BIOS 690 Biostatistical Research Seminar
Semester course; 1 lecture hour. 1 credit. Talks by the students, faculty, and visitors describing recent research or reviewing topics of mutual interest.

BIOS 691 Special Topics in Biostatistics
Semester course; lecture and laboratory hours by arrangement. 1-4 credits. Lectures, tutorial studies, library assignments in selected areas of advanced study or specialized biostatistical procedures not available in other courses or as part of the research training.

BIOS 697 Directed Research in Biostatistics
Semester course; 1-15 credits. Research leading to the M.S. or Ph.D. degree and elective research projects for other students.

Human Genetics

HGEN 501/BIOL 530 Human Genetics
Semester course; 3 credits. Prerequisites: BIOL 310 and CHEM 301, 302 and CHEZ 301L, 302L or equivalents. Emphasizes a broad approach, at an advanced level, to human genetics. Explores topics including cytogenetics, pedigree analysis, gene mapping, aneuploid syndromes, inborn errors of metabolism, neonatal screening, cancer, genetic engineering, behavior and intelligence, prenatal diagnosis and genetic counseling.

HGEN 502 Advanced Human Genetics
Semester course; 2-6 lecture hours. 2-6 credits. Prerequisite: HGEN 501 or equivalent. For human genetics graduate students only. A comprehensive study of the principles of specific areas in human genetics.

HGEN 511 Human Cytogenetics
Semester course; 3 lecture hours. 3 credits. Prerequisites: HGEN 501 or HGEN 502. A discussion of recent advances in human cytogenetics. Topics covered will include chromosome banding techniques and ultrastructure, meiosis, the identification and interpretation of structural abnormalities, fragile sites, cancer cytogenetics, methodology for linkage studies, and population cytogenetics. Clinical cases are used to illustrate the application of special diagnostic methodologies.

HGEN 516/BIOL 516 Population Genetics
Semester course; 3 lecture hours. 3 credits. Genetic and ecological factors affecting normal and abnormal variation within and between populations of organisms.

HGEN 528 Methods in Human Population Genetics
Semester course; 3 lecture hours. 3 credits. Data analysis and discussion of methods including segregation analysis and linkage. Topics covered will include inbreeding, ascertainment, and genetic epidemiology.

HGEN 525-526 Practice of Genetic Counseling
Continuous courses; 3 lecture hours. 3-3 credits. Provides context for practice of genetic counseling through literature review and practical techniques including emphasis on pregnancy and childhood evaluation, interviewing techniques, social and
methods and computer algorithms for genetic data analysis.

HGEN 620 Principles of Human Behavioral Genetics
Semester course; 3 lecture hours. 3 credits. The theory of genetic and nongenetic transmission of complex human traits with emphasis on: methods used in the design, analysis, and interpretation of studies to identify the principal genetic and environmental causes of behavioral variation. Includes statistical methods of intelligence, personality, social attitudes, and psychiatric disorders.

HGEN 631 Advanced Dental Genetics
Semester course; 1 lecture hour. 1 credit. This course follows HGEN 531 and provides instruction on the genetic basis for craniofacial and dental anomalies, caries and periodontal disease. Topics also include genetic consultation and ethical, legal and social issues surrounding genetic testing.

HGEN 630 Mathematical and Statistical Genetics
Semester course; 3 lecture hours. 3 credits. Prerequisite: HGEN 501 or equivalent. Provides an introduction to the rudiments of the theoretical and applied mathematical population genetics including the segregation of genes in families, genetic linkage and quantitative inheritance. Emphasizes the methods used in the analysis of genetic data.

HGEN 641 Human Biochemical and Molecular Genetics
Semester course; 4 lecture hours. 4 credits. Prerequisites: BIOS 543-544 or equivalent, or permission of instructor. Surveys the mechanisms and variations of human gene mutations resulting in human genetic disease and emphasizes different investigational disorders using current scientific literature.

HGEN 671 Genetic Analysis of Complex Traits
Semester course; 3 lecture hours. 3 credits. Prerequisite: Introductory biostatistics or permission of instructor. Introduces the theory and practice of analysis of complex human traits. Provides a solid grounding in the fundamental concepts, study designs and analytical strategies for this evolving and important area.

HGEN 617 Genetic Analysis of Complex Traits
Semester course; 3 lecture hours. 3 credits. Prerequisite: HGEN 617 or permission of instructor. Focuses on advanced topics related to segregation and linkage analysis. Presents alternatives to single major locus segregation patterns, advanced linkage analysis techniques such as multipoint mapping, and combined segregation and linkage analyses.

HGEN 619 Quantitative Genetics
Semester course; 3 lecture hours. 3 credits. The effects of genes and environment on complex human traits with emphasis on: Genetic architecture and evolution; nongenetic inheritance; mate selection; developmental change; sex-effects; genotype-environment interaction; resolving cause from effect; design of genetic studies, statistical
MICR 516 Mechanisms of Viral and Parasite Pathogenesis
Semester course; 3 lecture hours. 3 credits. A comprehensive introduction to the basic principles of virology and human parasitology. Interactions of the infecting agents and hosts will be stressed at the molecular and cellular level.

MICR 518 Molecular Mechanisms of Bacterial Pathogenesis
Semester course; 3 lecture hours. 3 credits. Prerequisites: undergraduate-level courses in microbiology or microbial physiology, immunology and molecular genetics. The goals of this course are to explore in detail the virulence mechanisms of microbes and the response of the infected host. The focus will be on important bacterial pathogens.

MICR 605 Prokaryotic Molecular Genetics
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOC/MIRC 503-504 and MICR 515 or permission of instructor. A comprehensive introductory course examining the organization of the genetic material in bacteria and their viruses and the molecular mechanisms involved in its maintenance, replication, exchange and expression. Emphasis will be on experimental approaches to the analysis of prokaryotic systems. Topics include regulation of transcription and translation, genetic engineering and recombinant DNA technology, horizontal gene transfer, conjugation, transduction and transformation.

MICR 653 Advanced Molecular Genetics: Bioinformatics
Semester course; 3 lecture hours. 3 credits. Prerequisites: MICR/BIOC 503-504 and MICR 515 or permission of instructor. An advanced course on contemporary bioinformatics. Topics covered include knowledge discovery in time series, the topology of biological networks, the organization and analysis of genomic and proteomic data, gene prediction and transcriptional regulation, sequence comparison, and analysis of eukaryotic and prokaryotic genomes.

MICR 686 Advanced Immunobiology
Semester course; 2 lecture hours. 2 credits. Open primarily to residents, medical students and graduate students with an immunology background. All MICR 505 S. Lectures, seminars and conferences on basic and clinical immunobiology. Topics have included tumor immunology, cell interactions in the immune response, genetics of the immune response, mechanisms of host-defense and membrane receptors in immunology and neoplasia.

MICR 690 Microbiology Research Seminar
Semester course; 1 lecture hour. 1 credit. Presentation and discussion of research reports and topics of current interest to the departmental seminar or special group seminars.

MICR 691 Special Topics in Microbiology
Semester course; 1-4 credits. Lectures, tutorial studies, and/or library assignments in selected areas of advanced study not available in other courses or as part of the research training.

MICR 692 Current Topics in Molecular Pathogenesis
Semester course; 1 lecture hour. 1 credit. Open to all graduate and certificate students. Presents a forum for the discussion of recent advances in the study of the molecular mechanisms of microbial pathogenesis. Consists of presentations by students, postdoctoral fellows and faculty followed by interactive discussions of the implications of presented work to the study of molecular pathogenesis.

MICR 697 Directed Research in Microbiology
Semester course; 1-15 credits. Research leading to the M.S. or Ph.D. degree and elective research projects for other students.

Neurosciences
NEUS 509/PHTX 509/ANAT 509/PHIS 509 Cellular and Molecular Neuroscience
Semester course; 4 lecture hours. 4 credits. Prerequisite: Permission of instructor. Designed as an interdisciplinary introduction to the cellular and molecular aspects of central nervous system function. The basic principles of neuroscience including neuronal structure, electrical properties of single neurons, cell biology of neurotransmitter release and postsynaptic function will be discussed, followed by intracellular signaling in neurons, gene regulation, transgenic model systems, glia, neuronal development, basic neurochemistry, and molecular and cellular aspects of motor, sensory and integrative function. The course will conclude with lectures on various aspects of neural injury and disease, including traumatic brain injury, Parkinson's and Alzheimer's diseases.

NEUS 691 Advanced Topics in Neurosciences
Semester course; 1 lecture hour. 1 credit. Prerequisite: Permission of instructor. Advanced topics in neuroscience with correlations to research and clinical applications. Interdisciplinary presentation of the relationship of principles of neuroscience to current areas of investigation.

Pathology
PATH 445/FRSC 445 Forensic Toxicology
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 101-102, CHEZ/FRSZ 101L; CHEM 301-302 and CHEZ 301L. Provides a comprehensive overview of the basic principles of toxicology and the practical aspects of forensic drug analysis. Students will learn to define the toxic agents most commonly resulting in legal problems in U.S. society and also the process by which the U.S. judicial system is aided by scientific evidence.

PATH 521 Laboratory Techniques in Diagnostic Pathology
Semester course; 3 lecture hours. 3 credits. This team taught course includes principles of automated and non-automated testing, diagnostic testing, and an active laboratory demonstration of each method.

PATH 522 Clinical Chemistry
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 12 credits. Prerequisite: Permission of instructor. The metabolic basis of disease and the interpretation of laboratory data for diagnosis and patient management.

PATH 540 Pathology for Allied Health Sciences
Semester course; 1.5 lecture and 1 laboratory hours. 2 credits. Explores clinical effects of changes involved in selected disease states, with emphasis on musculoskeletal and nervous systems. Provides the foundation to understanding clinical problems that physical therapists and other paramedical personnel will encounter and treat in their patients.

PATH 570 Experimental Approaches to Tumor Biology
Semester course; 3 lecture/discussion hours. 3 credits. Introduces central problems in tumor biology and the methods available for their study. Develops through lectures and research reports critical in research and interpretation of research reports.

PATH 590 Experimental Pathology Seminar
Semester course; 1 lecture hour. 1 credit.

PATH 601 General Pathology (Dentistry)
Semester course; 6 lecture hours. 6 credits. Instruction in the basic principles regarding alteration of structure and function in disease and in the pathogenesis and effect of disease in the various organ systems.

PATH 620 Special Topics in Modern Instrumental Methods
Semester course; 1 lecture and 2 laboratory hours. 2 credits. A study of some of the modern research methods of molecular biology. The student gains exposure to the technique concomitant with discussions with faculty. The student writes a comprehensive review of the technique studied.

PATH 690 Clinical Chemistry Seminar
Semester course; 1 lecture hour. 1 credit. Graduate students, residents, and staff present topics of current interest in clinical chemistry.

PATH 691 Special Topics in Modern Instrumental Methods
Semester course; 1 lecture and 2 laboratory hours. 2 credits. By special arrangement with instructor. A study of some of the modern research methods of molecular biology. The student gains experience with the technique concomitant with discussions with faculty. The student writes a comprehensive review of the technique studied.

PATH 697 Research in Pathology
Semester course; 1-15 credits. Research leading to the Ph.D. degree and elective research projects for other students.

Pharmacology and Toxicology
PHTX 441 Pharmacology (Dental Hygiene)
Semester course; 5 lecture hours. 5 credits. A didactic course designed to emphasize the principles of pharmacology and pain control and the rationale of drug actions, uses, and adverse effects.
PHTX 509/ANAT 509/PHIS 509/NEUS 509 Cellular and Molecular Neuroscience Semester course; 4 lecture hours. 4 credits. Prerequisite: Permission of instructor. Designed as an interdisciplinary introduction to the cellular and molecular aspects of central nervous system function. The basic principles of neuroscience including neuronal structure, electrical properties of single neurons, cell biology of neurotransmitter release and postsynaptic function will be discussed, followed by intracellular signaling in neurons, gene regulation, transgenic model systems, glia, neuronal development, basic neurochemistry, and molecular and cellular aspects of motor, sensory and integrative function. The course will conclude with lectures on various aspects of neural injury and disease, including traumatic brain injury, Parkinson’s and Alzheimer’s diseases.

PHTX 515 Pharmacology for Nurse Anesthetists I Semester course; 3 lecture hours. 3 credits. The basic principles of pharmacology including mechanisms of absorption, distribution, biotransformation, elimination, dose-response relationships and receptor interactions are presented followed by a detailed discussion of autonomic, cardiovascular, and renal pharmacology as it relates to nurse anesthesia. Detailed presentation of the pharmacology of classes of drugs used by nurse anesthetists will be made, with emphasis on general anesthetics.

PHTX 516 Pharmacology for Nurse Anesthetists II Semester course; 3 lecture hours. 3 credits. Prerequisite: PHTX 515. Detailed presentation of the pharmacology of classes of drugs used or encountered by nurse anesthetics will be made with emphasis on local anesthetics, cardiovascular, chemotherapeutic, and anti-inflammatory agents. Continuation of PHTX 515.

PHTX 535 Introduction to Toxicology Semester course; 4 lecture hours. 4 credits. The basic principles of toxicology and toxicological mechanisms; correlations of toxicological responses with biochemical, functional and morphological changes; environmental (including occupational and public health) regulatory concerns; and risk assessment and management are presented for graduate students in the biomedical sciences.

PHTX 536 Principles of Pharmacology and Toxicology Semester course; 5 lecture hours. 5 credits. Prerequisites: PHIS 501 and BIOC 503, or permission of instructor. A comprehensive course in pharmacology for graduate students. The mechanisms of action of major classes of pharmacologically active agents and basic principles of pharmacology are discussed. Topics include drug absorption, distribution, and metabolism; chemotherapy; endocrine pharmacology and principles of toxicology/immunotoxicology.

PHTX 537 Principles of Pharmacology and Toxicology Semester course; 5 lecture hours. 5 credits. Prerequisite: PHTX 536 or permission of instructor. Topics include receptor theory, autonomic, cardiovascular, and central nervous system pharmacology and toxicology. Continuation of PHTX 536.

PHTX 548 Drug Dependence Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate or post-baccalaurate standing. A broad survey course in problems of drug and alcohol use and abuse. It will focus on the pharmacology of abused drugs as well as a study of the psychological and sociological factors in drug-taking behavior, rehabilitation and prevention. This course may not be taken in lieu of any pharmacology offerings in the professional schools on the MCV Campus.

PHTX 597 Introduction to Pharmacological Research Semester course; 1-12 credits. Prerequisite: Permission of instructor. Rotation research in pharmacology and toxicology laboratories for beginning graduate students.

PHTX 603 Principles of Pharmacology (Pharmacy) Semester course; 2.7 lecture and 0.3 laboratory hours. 3 credits. The basic principles of pharmacology and an in-depth consideration of the biodisposition and mechanisms of action of drugs acting on the autonomic nervous system, chemotherapeutic agents, and endocrine agents are covered this semester.

PHTX 604 Pharmacological Agents (Pharmacy) Semester course; 3 lecture and 0.3 conference hours. 4 credits. Includes drugs acting on the cardiovascular and central nervous system and principles of toxicity. This is a continuation of PHTX 603.

PHTX 609 General Pharmacology and Pain Control Semester course; 2 lecture hours per week for 2 semesters. One grade for 4 credits at end of second semester. A two-semester course that covers the study of the effects of chemical agents on the structure and function of living tissues, which may be normal or pathological. Provides a basic understanding of pharmacological principles and the basic concepts of currently accepted theories of pain mechanisms and provides a scientific basis for the use of therapeutic agents in order that the future dentist will be able to safely administer analgesics by parenteral, oral or inhalation routes.

PHTX 611 Dental Pharmacology and Pain Control Semester course; 2 lecture hours per week. 2 credits. Offered for the D-3 students who have successfully completed PHTX 609. A continuation of PHTX 609. The study of the effects of chemical agents on the structure and/or function of living tissues, which may be normal or pathological. Provides a basic understanding of pharmacological principles and the basic concepts of currently accepted theories of pain mechanisms and provides a scientific basis for the use of therapeutic agents in order that the future dentist will be able to safely administer drugs to control pain by parenteral, oral or inhalation routes. PHTX 611 differs from PHTX 609 in that the material presented is more clinical in content and more classes involve clinical correlates of the didactic material presented.

PHTX 614 Foundation in Psychoneuroimmunology Semester course; 3 lecture hours. 3 credits. Prerequisite: A graduate level course in either immunocompetence, pharmacology, physiology, immunology, biochemistry, psychology or permission of instructor. This course will provide an in-depth overview of how brain and immune systems interact to maintain physiological and biochemical steadiness and to ensure wellness. Theory and research drawn from neuroscience, immunology and psychology will be examined as a foundation for understanding mind-body relationships.

PHTX 620/PHIS 620 Ion Channels in Membranes Semester course; 3 lecture hours. 3 credits. Previous course work including basic concepts in electrophysiology, such as those covered in PHS 501 or PHTX/PHIS/ANAT 509, is highly recommended. Detailed presentation of the fundamental biophysical properties of ionic channels in membranes including the elementary properties of pores, molecular mechanisms of ionic selectivity, mechanisms of drug block, structure-function relationships, and basis for channel gating. Discussion will encompass modern techniques for studying ion channel function.

PHTX 625 Cell Signaling and Growth Control Semester course; 3 lecture hours. 3 credits. Prerequisite: PHTX 536 or consent of instructor. Covers biochemical and molecular biology approaches to pharmacological problems. Emphasizes signal transduction, oncogenes, protein kinases, stress responses and the control of cellular proliferation.

PHTX 632 Neurochemical Pharmacology Semester course; 3 lecture hours. 3 credits. Prerequisite: PHTX 536 or permission of instructor. Investigates the mechanisms of drugs acting on the central nervous system in relation to their effects on endogenous neurochemical systems. Examines the milieu in which drugs act upon the central nervous system, experimental techniques frequently used in neuropharmacology, specific neurotransmitter systems, as well as the mechanisms of action of specific drugs.

PHTX 633 Behavioral Pharmacology Semester course; 3 lecture hours. 3 credits. This is a survey course covering research on the effects of drugs on behavior. The major emphasis will be on schedule-controlled learned behavior. Additional topics will include drug self-administration, drug discrimination, and conditioned drug effects and behaviors in toxicolgy. The course focuses primarily on laboratory animals although human research will also be covered. The relevance of this research literature to drug treatment of behavioral disorders and substance abuse will be discussed.

PHTX 637 Cellular Pharmacology Semester course; 3 lecture hours. 3 credits. Prerequisite: PHTX 536 or consent of instructor. The principles governing the interactions of drugs and hormones with their cellular receptors are presented followed by a discussion of the biochemical mechanisms by which the interactions are transduced into specific cellular responses. Lectures are supplemented with demonstrations and student presentations of current literature in the area.
PHTX 638 Cellular Mechanisms of Toxicology
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHTX 536 or permission of instructor. A holistic approach is taken to describe and analyze toxicological information. Intact animal, organ, cellular, and biochemical responses to toxic agents are presented. Immunologic, genetic, endocrine, and central nervous system paradigms and their relationship to the mechanism of action of toxic agents as well as the predictive value of tests of the systems are presented. Kinetics and metabolism of toxic agents as well as statistical and analytical procedures are integrated into the discussions.

PHTX 639 Drug Development
Semester course; 1 lecture and 4 laboratory hours. 3 credits. Prerequisites: PHTX 536 and PHTX 537, or their equivalents. The principles of drug screening, advanced testing, and procedures necessary prior to the clinical evaluation of new products are described. An emphasis is placed on physiological type procedures used in pharmacology.

PHTX 644 Forensic Toxicology
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Lecture and demonstrations in which common poisons and groups of poisons are discussed as to detection, diagnosis, and treatment of poisoning. Demonstrations include basic principles of analytical toxicology, forensic science, and courtroom testimony.

PHTX 690 Pharmacology Research Seminar
Semester course; 1 lecture hour. 1 credit. Members of the departmental staff, students, and visiting lecturers participate in discussions on topics of current and historical interest.

PHTX 691 Special Topics in Pharmacology
Semester course; 1-4 credits. Prerequisite: Permission of instructor. Special topics in pharmacology or toxicology covered in less detail in other courses will be studied in depth in this course.

PHTX 697 Directed Research in Pharmacology
Semester course; 1-15 credits. Research leading to the M.S. or Ph.D. degree and elective projects for other students.

Physiology

PHIS 206 Human Physiology
Semester course; 3 lecture hours. 3 credits. Prerequisite: A "C" grade or better in BIOL 101 and 101L or equivalent. Functioning of the human body with emphasis on experimental procedures. Not applicable toward biology major.

PHIS 206L/BIOZ 206L Human Physiology Laboratory
Semester course; 2 laboratory hours. 1 credit. Pre- or corequisites: PHIS 206. Functioning of the human body with emphasis on experimental procedures. Not applicable toward biology major.

PHIS 461 Introduction to Human Physiology
3 lecture hours. 3 credits. Prerequisites: Biology, general chemistry, and human anatomy. An introductory course to human physiology based on an analysis of organ systems.

PHIS 501 Mammalian Physiology
Semester course; 5 lecture hours. 5 credits. Prerequisites: Biology, chemistry, and physics. A comprehensive study of the function of mammalian organ systems, designed primarily for graduate students.

PHIS 502 Physiology and Pathophysiology (Dentistry)
Semester course; 5 lecture hours. 5 credits. Prerequisites: biology, chemistry and physics. A comprehensive study of the function of mammalian organ systems, designed primarily for dental students.

PHIS 504c Mammalian Physiology
Semester course; 3 lecture hours. 3 credits. A comprehensive study of the function of mammalian organ systems, designed primarily for pharmacy students.

PHIS 506 Mammalian Physiology (Pharmacy)
Semester course; 5 lecture hours. 5 credits. A comprehensive study of the function of mammalian organ systems, designed primarily for pharmacy students.

PHIS 509/ANAT 509/PHTX 509/NEUS 509 Cell Physiology
Semester course; 4 lecture hours. 4 credits. Prerequisite: Permission of instructor. Designed as an interdisciplinary introduction to the cellular and molecular aspects of central nervous system function. The basic principles of neuroscience including neuronal structure, electrical properties of single neurons, cell biology of neurotransmitter release and postsynaptic function will be discussed, followed by intracellular signaling in neurons, gene regulation, transgenic model systems, glia, neuronal development, basic neurochemistry, and molecular and cellular aspects of motor, sensory and integrative function. The course will conclude with lectures on various aspects of neural injury and disease, including traumatic brain injury, Parkinson’s and Alzheimer’s diseases.

PHIS 512 Cardiovascular and Exercise Physiology
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHIS 501 or permission of instructor. A comprehensive study of cell and system cardiovascular and exercise physiology with pathophysiological implications, primarily designed for professional students. Physiological basis and introduction to the practical interpretation of the electrocardiogram will be taught with a computer-assisted method.

PHIS 604 Cell Physiology
Semester course; 4 lecture hours. 4 credits. Serves first-year graduate students with a physiological understanding of excitable tissues at the cellular level. Topics covered include the resting membrane potential and action potential, communication between excitable cells, sensory transduction mechanisms and contractile tissues.

PHIS 606 Physical Principles in Physiology
Semester course; 4 lecture hours. 4 credits. Prerequisite: PHIS 605 or permission of instructor. A survey of those principles of physics and physical chemistry underlying physiological processes. Topics include energetics of equilibrium and nonequilibrium systems, electrode processes, reaction-diffusion systems, kinetics, photochemistry, physical techniques in physiological research.

PHIS 612 Cardiovascular Physiology
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. An in-depth study of the original literature in selected areas of cardiovascular physiology.

PHIS 615 Signal Detection in Sensory Systems
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHIS 501 or permission of instructor. An in-depth study of cells and cell systems that serve either internal or external environmental sensors. Topics will emphasize the physiology, anatomy and the biochemistry of mature sensing systems, the systems in normal development and their plasticity toward stresses during development or in maturity.

PHIS 617 Cellular Signaling
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHIS 501 and BIOL 503, or permission of instructor. An in-depth study of the original literature in selected areas that involve cellular signaling.

PHIS 618 Renal and Epithelial Physiology
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHIS 604 or permission of instructor. An in-depth study of selected areas of renal and epithelial physiology. Topics include mechanisms of salt and water transport in the nephron, urinary concentrating mechanisms, hormonal regulation of ion transport, and the role of the kidney in acid-base homeostasis, diuretics, ion transport in amphibian epithelia, water and solute transport in gastrointestinal epithelia and lingual epithelium.

PHIS 620/PHTX 620 Ion Channels in Membranes
Semester course; 3 lecture hours. 3 credits. Previous course work including basic concepts in electrophysiology, such as those covered in PHIS 501 or PHTX/PHIS/ANAT 509, is highly recommended. Detailed presentation of the fundamental biophysical properties of ionic channels in membranes including the elementary properties of pores, molecular mechanisms of ionic selectivity, mechanisms of drug block, structure-function relationships, and basis for channel gating. Discussion will encompass modern techniques for studying ion channel function.

PHIS 630 The Application of Network Thermodynamics to the Analysis and Computer Simulation of Life Processes
Semester course; 3 lecture and 4 laboratory hours. 5 credits. Prerequisite: Consent of instructor. Network thermodynamics applied to organization in living systems. Relations between biological and electrical networks. Simulation of nonlinear, complex, dynamic, physiological, pharmacological, and biochemical systems with applications to diffusion, blood flow, reaction kinetics, membrane transport (cellular and epithelia), endocrine effects, cellular and whole body pharmacokinetics, model design and verification, metabolic regulation and control, reaction-diffusion systems, morphogenesis, others.

PHIS 690 Physiology Research Seminar
Semester course; 1 lecture hour. 1 credit. Presentation and discussion of research reports and topics of current interest to the departmental seminar or special group seminar.
PHIS 691 (Section 1) Special Topics in Physiology
1-4 credits. Prerequisites: A 500-level physiology course or equivalent and permission of instructor. Lecture, tutorials, laboratory assignments in selected areas of advanced study not available in other courses or as part of the research training.

PHIS 691 (Section 3) Special Topics: Student Seminar
Semester course; 1 credit. Designed to develop skills in preparing and delivering lectures and other oral presentations. Students present talks on topics in which they are particularly interested, and provide mutual constructive criticism.

PHIS 691 (Section 5) Special Topics: Nutrition Research
Semester course; 3 credits. Weekly discussion of selected topics in nutrition. Topics change yearly. Topics include biochemical aspects of nutrition to International Nutrition, with selections from various levels of nutritional interest presented each year. Past topics have included nutrition and exercise, diet and cancer, total parenteral nutrition, alcohol nutrition, food safety, drug-nutrient interactions, nutrition and immunological response, cholesterol and nutrition, salty taste mechanisms, vitamin A, vitamin D, and intestinal calcium absorption.

PHIS 697 Directed Research in Physiology
Semester course; 1-15 credits. Research leading to the M.S. or Ph.D. degree and elective research projects for other students.

Preventive Medicine and Community Health

PMCH 511 Industrial Hygiene: Hazard Identification and Evaluation
Semester course; 3 lecture hours. 3 credits. Basic concepts include identification and evaluation of toxic substances and physical agents in the workplace and in the environment, health effects of chemicals, epidemiology, toxicology, biological monitoring, dermatosis, air sampling and regulatory aspects.

PMCH 512 Industrial Hygiene: Methods of Hazard Control
Semester course; 3 lecture hours. 3 credits. Describes methods of control of occupational and environmental hazards including engineering controls, work practices, administrative controls, personal protective equipment, respiratory protection through the use of respirators and ventilation systems. Ergonomic hazards, noise, heat and cold environments, and radiation also will be addressed.

PMCH 521 Regulation of Toxic Substances
Semester course; 3 lecture hours. 3 credits. This course introduces the student to the administrative law and policy issues. This course examines the Clean Water Act, Clean Air Act, Resources Conservation & Recovery (RCRA), Federal Facility Compliance Act, Comprehensive Environmental Response, Compensation and Liability Act (CERCLA-Superfund), Toxic Torts; Real Estate Issues; Recovery of Money Damages; Criminal Law, Occupational & Mine Safety & Health Acts (OSHA/MSHA); Workman’s Compensation; Occupational Disease; Victim Compensation, Safe Drinking Water Act; Pollution Prevention Act, Food Drug & Cosmetic Act, RCRA & Superfund Regulated Entities; Superfund; and Environmental Health are presented, with emphasis on biological, chemical, and physical factors that influence human health. Current workplace and public health safety and regulatory issues are emphasized.

PMCH 531/BIOS 531 Clinical Epidemiology
Semester course; 3 lecture hours. 3 credits. Prerequisite: Must have completed statistics course before enrollment. Case studies will be used to examine epidemiological techniques in epidemiology course with permission of instructor. A survey course which focuses on the concepts of epidemiology and its role in risk assignment. This course is designed to distill the underlying theory and the principles used by epidemiologist. The course will introduce the sources of vital data, their conversion into morbidity and mortality rates and indices. Procedures such as age standardization and abridged life table will be introduced. Concepts of disease transmission, epidemiology and various summary statistics. The Surgeon General’s criteria for causation will be examined, designs in epidemiological research reviewed, and the use and limitations for epidemiological data in risk assessment described. Students should have current VAX account and some background in mathematics and elementary statistics.

PMCH 541 Principles of Waste Management
Semester course; 3 lecture hours. 3 credits. Design and operation of waste treatment, storage, disposal and control processes will be covered. Design tanks, landfills, and incinerators will be discussed in detail. Data acquisition and interpretation methods needed for process control and monitoring will be examined.

PMCH 543/BIOS 543/STAT 543 Statistical Methods I
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing, or one course in statistics and permission of instructor. Basic techniques of statistical methods, including: the collection and display of information, data analysis, and statistical measures; variation, sampling and sampling distribution; point estimation, confidence intervals and tests of hypotheses for one and two sample problems; principles of one-factor experimental design, one-way analysis of variance and multiple comparisons; correlation and simple linear regression analysis; contingency tables and tests for goodness of fit. Students may not receive degree credit for both STAT 541 and STAT 543. STAT 543 is not applicable toward the M.S. degree in mathematical sciences or the M.S. degree in computer science.

PMCH 571 Principles of Epidemiology
Semester course; 2 lecture and 1 seminar hours. 3 credits. A theoretical foundation for understanding the health problems and needs of American society and uses scientific and social knowledge to examine factors that cause and alter the course of health problems in selected populations.

PMCH 583 Industrial Ventilation
Semester course; 3 lecture hours. 3 credits. Principles of design and evaluation of local exhaust systems. Principles of airflow, characteristics of pressure losses, and selection of air cleaners and air moving.

PMCH 600 Introduction to Public Health
Semester course; 3 lecture hours. 3 credits. Describes the public health system in the United States. Explores the disease prevention and philosophy and foundations of public health education, economics, law, politics and social issues. Examines the use of epidemiology and statistics to determine public health problems.

PMCH 602/HADM 602 Health System Organization, Financing and Performance
Semester course; 3 lecture hours. 3 credits. Examines the structure, functioning and financing of the U.S. health services system. Emphasizes foundational concepts for understanding and analyzing patterns of health and illness; health care cost, quality, access and utilization; workforce; competition in health care markets; and supplier and payer effectiveness and efficiency.

PMCH 603 Public Health Policy and Politics
Semester course; 3 lecture hours. 3 credits. Provides an understanding of public health policy development process, the influence of politics and special interest groups on this process, and current governmental policies for the provision of major public health services. The legislative process is a major focus of the course.

PMCH 604 Principles of Occupational and Environmental Health I
Semester course; 3 lecture hours. 3 credits. Basic principles of occupational and environmental health are presented, with emphasis on biological, chemical, and physical factors that influence human health. Current workplace and public health safety and regulatory issues are emphasized.

PMCH 605 Epidemiology of Health Behaviors
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 543 and PMCH 571. Provides an overview of the surveillance and epidemiology of specific health-related behaviors; the relationship between these behaviors and health outcomes, and available evidence for the effectiveness and appropriateness of various approaches to modification of these behaviors. This material will be covered in the context of theories of health-related behavior and of methodological issues concerning the assessment of these behaviors and their relationships to outcomes of interest. The applicability of this material to underserved populations will be emphasized. The course material, as far as possible, will be that of an interactive seminar.

PMCH 606 Epidemiologic Methods II
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 543 and PMCH 571. This course focuses on examining the design, conduct and analysis of epidemiologic studies and the methods to deal with the problems of bias, confounding, and effect modification; using multivariate modeling techniques in epidemiology; using applications of logistic regression and Cox regression models to answer relevant research questions; solving meta-analytic problems using fixed and random effects models; understanding specific research areas of disease screening and exposure assessment; writing a research paper.
resulting from epidemiologic analyses of a large data set.

**PMCH 607 Nutritional Epidemiology**
Semester course; 3 lecture hours. 3 credits.
This course focuses on methods of measuring exposures to dietary factors for epidemiologic investigations of diet-disease relationships and risk assessment. An introductory course in basic epidemiology is a prerequisite. Students learn to select the appropriate method(s) of collecting and analyzing food intake and to evaluate the adequacy of dietary assessment methods used in published epidemiological studies.

**PMCH 610 Environmental and Occupational Epidemiology**
Semester course; 3 lecture hours. 3 credits.
Prerequisites: BIOS 543 and PMCH 571. This course is designed to provide students with an overview of the principles, methods and content of environmental and occupational epidemiology with a focus on designing, conducting, and interpreting studies on the effects of chemical and physical agents. Students will critique published occupational and environmental epidemiology studies, learn how to evaluate the potential for cause-effect relationships, and become familiar with the role of epidemiology in human health risk assessment. Each session will include a seminar component where exercises are completed and/or published papers will be critiqued.

**PMCH 615 Public Health Issues and Interventions in Communities of Color**
Semester course; 3 lecture hours. 3 credits. This course is an overview of many critical psychological, social, cultural, demographic, biological, and other factors that influence lifestyle and disease susceptibility among minority status ethnic groups and other medically underserved populations in the United States. A lecture/discussion seminar format will be used, along with readings, student presentations and guest lecturers working in the field, to: (1) improve the students' understanding of the underpinnings of health status differences across communities; and (2) provide students with tools that can be used in developing effective interventions to ameliorate the maldistribution of health risk behavior and disease burden.

**PMCH 616 Public Health Education**
Semester course; 3 lecture hours. 3 credits. Provides the student with an examination of theory and practice of public health education. This examination represents an overview of selected topics that are congruent to the Responsibilities and Competencies for Entry-Level Health Educators. Specifically, course content will be centered around assessing individual and community needs for health education programs, coordinating provision of health education services, acting as a resource for public health departments, and communicating health and health education needs, concerns, and resources.

**PMCH 617/HADM 626 International Health**
Semester course; 3 lecture hours. 3 credits. Provides an overview of and/or introduction to international health. Focus is on the relationship between external factors and the health of populations.

**PMCH 618 Public Health Law**
Semester course; 3 lecture hours. 3 credits. Provides the student with an overview of the legal system and states and regulations governing state and local health departments. This course examines the federal public health laws, medical malpractice, privacy and confidentiality issues, and health law, abortion and sterilization, patients rights, emergency medical care law, human experimentation, rights of the terminally ill, AIDS law, occupational and environmental health laws, and health planning and reimbursement law.

**PMCH 619 Intentional Injury**
Semester course; 3 lecture hours. 3 credits. Examines the number, distribution, and impact of intentional injuries in the United States, as well as the need for prevention. The course will focus on psychological, social, cultural, demographic, economic, biological, and other factors associated with their cause, control, and prevention. Through lectures and dialogue, expert panels, student presentations, reading, and other assignments, students are expected to become acquainted with theory and research findings from the behavioral sciences, behavioral epidemiology, public health, and other sources that are likely to contribute to: (1) a greater comprehension of the magnitude and complexities of violence and intentional injuries in American life and (2) advancements in our capacity to successfully confront this epidemic with public health and related measures.

**PMCH 620 Cancer Epidemiology**
Semester course; 3 lecture hours. 3 credits. Prerequisite: PMCH 571. The course will cover the use of epidemiologic methods to study cancer in populations. Students will review and critique studies that have led to the development of cancer prevention. Cause and association will be discussed in depth as risk factors associated with lung, colon and breast cancer and mesothelioma are defined.

**PMCH 621 Infectious Disease Epidemiology**
Semester course; 3 lecture hours. 3 credits. Prerequisite: PMCH 571. This course will discuss the origins of epidemiology and how epidemiology methods are continually applied to the study of communicable diseases. Several infectious diseases will be studied in depth to show the progression toward characterization of the natural history of the diseases and how policies regarding prevention have been defined. Smallpox, HIV/AIDS, the hepatitis family of agents and a vector-borne disease will be studied. In addition, the topic of antibiotic resistance will be covered in depth. How the epidemiology of an infectious agent relates to bioterrorism also will be discussed.

**PMCH 622 Advanced Epidemiological Protocol Design**
Semester course; 3 lecture hours. 3 credits. Prerequisites: PMCH 571, PMCH 606, BIOS 553 and BIOS 554. Develops skills needed to design and describe in written format a valid and appropriate epidemiology study to address specific hypotheses. Hypotheses and possible design methods will be discussed in class and subsequently students will present (both orally and in written form) a research design to include a critical review of the literature and hypotheses to be tested. The proposal must address sample size and power, exposure definition, methods for ascertainment of exposure assessment, prevention of measurement errors, and statistical methods proposed for analysis.

**PMCH 629 Journal Club**
Semester course; 1 lecture hour. 1 credit. Talks given by students and faculty discussing and critiquing recent published research or review articles. Graded as "S," "U" or "F."

**PMCH 630 Program Research Project**
Semester course; 9 clinical hours. 1-6 credits. Each student will complete a research project that demonstrates the application of the knowledge acquired in the MPH Program. The student will answer one or more relevant research questions. The final product is a scholarly written report of publishable quality. A proposal must be submitted for approval and credits are assigned commensurate with the complexity of the project. Arrangements are made directly with the faculty adviser. Graded as "S," "U" or "F."

**PMCH 690 Directed Research in Nutrition Research**
Semester course; 3 lecture hours. 1-6 credits. This course consists of weekly discussions of selected topics in nutrition led by the faculty plus an assigned paper and presentation at the end of the semester by each student. The topics to be presented by the faculty include: food safety, the aspartame example; diet, nutrition and cancer; exercise and nutrition; the vitamin A story; the FDA and food safety; the vitamin D story; cholesterol nutrition; nutrition and wound healing; how salty taste works; stable isotopes in nutrition studies.

**PMCH 692 Special Topics Research**
Semester course; 3 lecture hours. 1-6 variable credits. This course provides the opportunity for students to explore a special topic of interest under the direction of a faculty member. A proposal must be submitted for this approval and credits are assigned commensurate with the complexity of the project. Arrangements are made directly with the appropriate faculty member and department chair.

**PMCH 697 Directed Research in Epidemiology**
Semester course; 1-15 credits. Research leading to the Ph.D. degree. Graded as "S," "U" or "F."
Nursing

NURS 501 Advanced Professionalization I
Semester course; 1 lecture hour. 1 credit. Pre- or corequisites: Admission to the graduate program in nursing. Focuses on socialization to the roles and responsibilities related to advanced practice nursing. Explores applicability of nursing theory to advanced practice nursing.

NURS 502 Advanced Nursing Practice: Pharmacotherapeutics
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate standing or permission of the instructor. Develops the requisite knowledge of pharmacotherapeutics necessary for the safe pharmacological management of common patient problems by the advanced practice nurse.

NURS 503 Advanced Nursing Practice: Psychosocial
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 201 or R.N. license. Examines and analyzes selected psychosocial theories and research, relating them to advanced practice nursing. Derives nursing strategies for phenomena of concern associated with specialty areas.

NURS 504 Advanced Nursing Practice: Biomedical
Semester course; 3 lecture hours. 3 credits. Focuses on the biological changes underlying selected health risks and health problems as a framework for critically appraising health assessment data and for understanding advanced nursing therapeutic strategies.

NURS 505 Advanced Nursing Practice: Computer and Information Technology
Semester course; 1-credit. Prerequisite: Admission to the Graduate Program in Nursing or permission of instructor. Provides students with knowledge and skills necessary to incorporate information technology into nursing practice and to be successful users of information technology programs and systems. Knowledge of nursing-specific applications will be emphasized. Graded as pass/fail.

NURS 508 Advanced Nursing Practice: Systems
3 lecture hours. 3 credits. Provides an understanding of the context in which health services are planned and delivered. Explores social, ethical, and political issues affecting current and future nursing care delivery systems. Examines cost effectiveness of nursing care in a variety of settings.

NURS 509 Advanced Nursing Practice: Community
3 lecture hours. 3 credits. Emphasizes target populations in the community as a perspective for advanced nursing practice. Introduces small area analysis to diagnose and prioritize health needs, problem-solving and planning, provision, and evaluation care for individuals, families, and population groups. Uses advanced nursing practice skills to examine the need for risk reduction and health promotion, health preservation and rehabilitation among community populations.

NURS 510 Nursing Ethics
3 lecture hours. 3 credits. Identifies and examines moral dilemmas encountered in professional nursing practice. Examines personal values, ethical theory and principles to dilemmas in clinical nursing practice: patient’s rights, informed consent, confidentiality, quality of life and death and dying. Examines relationships between professional nursing and resolution of moral dilemmas.

NURS 511 Health Assessment for Advanced Nursing Practice
1 lecture and 2 laboratory hours. 3 credits. Prerequisite: Undergraduate or graduate health or physical assessment course (3 credits). Provides the framework for holistic, culturally relevant assessment of individuals. Focuses on advancing students’ knowledge and assessment in the context of relevant programs, practice problems, issues, and concerns. Reviews major research design and analytic strategies.

NURS 512 Advanced Nursing Science
3 lecture hours. 3 credits. Focuses on theory and research in advanced practice with an aim of critique and utilization of current theories and findings/outcomes. Emphasizes analysis and synthesis of nursing science in the context of relevant programs, practice problems, issues, and concerns. Reviews major research design and analytic strategies.

NURS 514/INTL 514 International Perspectives on Community Health in Developing Countries
Semester course; 1 lecture and 2 laboratory hours. 3 credits. This course may be taken for a maximum of 6 credits in two different world areas. Open to graduate (junior or senior level) and graduate students. Explores the impact of national and international policy decisions on the health and well-being of individuals (country varies semester to semester). Examines the relationship of cultural beliefs and values on health-seeking behaviors. Allows students to become immersed in a culture different than their own. Evaluates the impact of international conflict and economic development on the health status of the community. See the Schedule of Classes for location.

NURS 540 Spirituality in Health Care
3 lecture hours. 3 credits. Explores the phenomenon of spirituality in health and illness across cultures and life spans from a framework of humility and respect for multiple world views. Integrates theory and research as well as individual and communal ways of knowing to provide spiritually sensitive care that nurtures wholeness and promotes healing.

NURS 591 Special Topics
Semester course; 1-3 credits. Explores specific topics in nursing theory and practice.

NURS 592 Directed Study in Nursing
1-3 credits. Prerequisite: Permission of instructor. Independent study in a specific area of nursing developed under the supervision of a member of the graduate faculty.

School of Nursing

NURS 601 Advanced Professionalization II
1 lecture hour. 1 credit. Prerequisite: NURS 501. Facilitates enactment of selected advanced practice role following graduation from the program. Focuses on issues influencing implementation of selected advanced practice role.

NURS 622 Integrative Psychiatric Mental Health Nursing Practicum
Semester course; 3-9 practicum hours. 1-3 credits. Prerequisites: NURS 502, NURS 503, NURS 504 and NURS 511. Co- or prerequisite: NURS 656. Uses application of diagnostic algorithms for the most common psychiatric symptoms as a framework in the psychopharmacological assessment of mental disorders seen in adolescents, adults and the elderly. Employs clinical assessment tools to assess the psychiatric and psychosocial needs of families and groups considering the biological, environmental, lifestyle, and sociocultural impact on the diagnosis of individuals with acute or chronic primary health care problems.

NURS 623 Integrative Psychiatric Mental Health Nursing Practicum II
Semester course; 3-12 practicum hours. 1-4 credits. Prerequisite: NURS 622. Co- or prerequisite: NURS 657. Prepares individuals for advanced psychiatric mental health practice by integrating theoretical, clinical and research knowledge in acute and primary mental health care settings. Applies nursing process in advanced psychiatric mental health practice. Explores contemporary somatic and psychotherapies with preceptors and faculty in advanced clinical practice. Emphasizes application of integrated knowledge related to theories and therapeutic techniques for individuals, families and groups, particularly urban and underserved. Experiences selected by preceptors consider individual learning needs and desires of students.

NURS 624 Integrative Psychiatric Mental Health Nursing Practicum III
Semester course; 3-12 practicum hours. 1-4 credits. Prerequisites: NURS 509 and NURS 623. Co- or prerequisite: NURS 659. Prepares individuals to apply knowledge in primary mental health to urban and underserved populations with acute and chronic conditions. Students employ approaches that address population-specific needs of communities with varied social and cultural contexts. Advanced practice nursing care planned, delivered and evaluated consistent with integrative health promotion services and health promotion strategies and current research findings. Alternative and complementary approaches incorporated based on relevance and efficacy.

NURS 627 Critical Care Nursing
Semester course; 2 lecture and 1 laboratory hours. 3 credits. Prerequisites: R.N. license, Advanced Cardiac Life Support Certification (ACLS, PALS or NALS), NURS 511 and NURS 504. Focuses on critical care technologies that are used in care of the critically ill. Course content will include the theoretical principles on which the selected technologies are based as well as discussions of the practical use and troubleshooting of the technologies presented. Provides experience in critically evaluating research and evidence-based guidelines related to commonly used critical care technologies.
NURS 632 Health Promotion in Women 1-2 lecture hours. 1-2 credits. Addresses issues that affect the health of women throughout the life cycle. Reflects the historical, developmental, biological, psychological, and sociological perspectives of understanding the condition of women in our society and the impact on their health care needs. Focuses on advanced practice role in health promotion and early detection of health problems, sociopolitical variables that impact women’s health, and the application of alternative paradigms in health care practice.

NURS 633 Common Health Problems of Women Semester course; 1-3 lecture hours. 1-3 credits. Prerequisites: NURS 504 and NURS 511. Provides content on common physical and psychosocial health and illness changes of women. Emphasizes health promotion and maintenance, as well as illness prevention, detection and management approaches. Includes cultural, historical, developmental, health and illness changes related to the management of common health problems, sociopolitical variables that impact women’s health, and the application of alternative paradigms in health care practice.

NURS 634 Advanced Practice: The Childbearing Woman Semester course; 2 lecture hours for Family Health students and 3 lecture hours for Women’s Health students. 2-3 credits. Prerequisite or corequisite: NURS 501, 502, 504 and 511. Note: the last third of the course, which focuses on high risk perinatal conditions, is required for the Family Health students but required for the Women’s Health students. Focuses on management of potential and actual health problems of women as members of families and their newborns during the perinatal period, pregnancy, labor, delivery, the postpartum and neonatal periods. Nursing assessment, diagnosis related to health promotion, treatment and prevention of perinatal problems are addressed. Emphasizes the integration of theories and research in perinatal health and the role of the advanced practice nurse in caring for these clients.

NURS 647 Health Promotion and Disease Prevention in Children Semester course; 3 lecture hours. 3 credits. Prereq. or coreq. NURS 501 and NURS 511. Focuses on health needs of well children from infancy through adolescence, and their families. Emphasizes health promotion and disease prevention, and early identification of illness and disease. Integrates concepts of development, family systems, and individual and family adaptation. Develops a student’s skills in pediatric screening, growth and development and behavioral assessment. Stresses collaborative decision making with children and families.

NURS 648 Management of Acute Problems of Children and Adolescents 1-3 lecture hours. 1-3 credits. Prerequisites: NURS 504 and NURS 511. Focuses on management of advanced nursing practice related to the management of common developmental, health and illness changes of children and adolescents. Includes pathophysiological, pharmacological, and nutritional management implications. Emphasizes the development of diagnostic reasoning and critical thinking skills in the management of common health problems, using selected organizing frameworks.

NURS 649 Chronic Illness and Disability in Children 3 lecture hours. 3 credits. Prerequisites: NURS 501, NURS 503, NURS 504, NURS 511, NURS 512, NURS 518, NURS 524, NURS 662, NURS 672 and NURS 673. Corequisite: NURS 674 or permission of instructor. Prepares the student to manage children and adolescents with chronic illness, disability or complex health conditions across health care settings. Integrates well child care with the management of the chronic or complex conditions.

NURS 654 Nurse as Integrative Healer Semester course; 6 seminar hours. 3 credits. Prereq. or coreq: Admission to graduate program or permission of instructor. Focuses on understanding and application of principles derived from the art and science of integrative healing to self-care and care of others as critical to the role of advanced practice nurse in mental health and holistic nursing. Provides theoretical, experiential, learning strategies and demonstrations as primary modalities of learning. Graded "CO" during summer and fall. Designed for continuing enrollment for one summer session and two academic semesters.

NURS 655 Nurse as Integrative Leader Semester course; 4 seminar hours. 2 credits. Prerequisite: Admission to graduate program or permission of instructor. Explores central theories and knowledge of leadership with emphasis on implications for the advanced practice nurse. Explores student’s capacity for leadership, including contemporary contexts and personal propensities, strengths, and deterrents to effective leadership practice. Includes learning experiences designed to enhance student’s self-understanding as leaders and health care healers in a diverse urban arena for practicing emerging competencies. Requires an action plan designed, in consultation with faculty mentor, to systematize the leadership skills over two semesters. Designed for continuous enrollment for two semesters, graded "CO" during the fall.

NURS 656 Integrative Mental Health Nursing: Management and Treatment of Psychopathology for Advanced Practice Nurses Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 502, NURS 504 or permission of instructor. Synthesizes advanced practice knowledge relevant to the primary care of individuals with psychiatric disorders from a neurobiological and psychopharmacological perspective. Integrates diagnostic algorithms with biological and psychological theories and research findings pertinent to care of individuals. Addresses knowledge needed for assessment, diagnosis and management of culturally diverse clients with psychiatric disorders in primary care settings. Examines neurobiology in the context of experience.

NURS 657 Integrative Mental Health Nursing: Consultation and Practice Semester course; 3 lecture hours. 3 credits. Prerequisites: NURS 502, NURS 503, NURS 504, NURS 511, NURS 512, NURS 540 and NURS 656. Pre- or corequisites: NURS 654 and NURS 658. Prepares individuals for advanced psychiatric mental health nursing practice by integrating theoretical, clinical, and research knowledge for primary mental health care and clinical management of acute and chronic mental health conditions. Explores advanced nursing assessment, classifications and interventions from cultural perspectives in a variety of settings. Emphasizes urban and underserved populations. Covers standards and scope of advanced practice psychiatric mental health nursing with emphasis on clinical management, policy-practice relationships and reimbursable services. Examines knowledge and therapeutic techniques for individuals, families and groups within an integrative context for advanced nursing practice and interdisciplinary leadership.

NURS 658 Complementary Healing Modalities Semester course; 3 lecture hours. 3 credits. Prerequisite: Admission to the graduate program or permission of the instructor. Critically examines complementary health strategies from a variety of perspectives including social, historical, cultural, political and economic contexts. Analyzes philosophical, theoretical and research literature associated with the use of complementary healing modalities. Explores frameworks for advanced nursing practice that incorporate tenets of healing modalities. Students will have the opportunity to select and examine a complementary health strategy for in-depth study and potential application.

NURS 659 Integrative Mental Health Nursing: Synthesis Semester course; 4 lecture hours. 4 credits. Prerequisites: NURS 508, NURS 509, NURS 656 and NURS 657. Co- or prerequisites: NURS 624 and NURS 655. Focuses on theory and practice of integrative mental health nursing and its role in addressing acute and chronic conditions from a population-specific perspective. Integrates and synthesizes psychosocial and holistic theoretical frameworks, and knowledge for advanced primary mental health practice with a community focus. Students will plan care based on integrative assessments and incorporate strategies with an emphasis on urban and underserved communities. A capstone project reflecting a synthesis of integrative nursing knowledge for advanced practice will be conducted and presented.

NURS 660 Advanced Adult Health I 3 lecture hours. 3 credits. Pre- or corequisites: NURS 501, 504 and 511. Focuses on advanced nursing assessment and therapeutics across the life span from adolescence to old age. Applies theories, concepts and research findings related to health promotion, health protection and disease prevention as a basis for clinical decision making with adolescent and adult patients and their families within a variety of care settings.

NURS 661 Advanced Adult Health II 1-4 lecture hours. 1-4 credits. Prerequisites: NURS 511, NURS 501. Provides content on selected common health and illness changes encountered in primary/ambulatory care settings using clinical simulations. Focuses on increasing students’ knowledge and clinical decision-making skills in order to promote health, accurately diagnose, prevent and manage these common problems.
NURS 511, NURS 504 and NURS 661. Provides content on selected common health and psychological issues encountered in acute care settings using clinical simulations. The focus of this course is on increasing students' knowledge and decision-making skills in order to diagnose, present, and manage these common acute and chronic problems.

NURS 668 Advanced Nursing Therapeutics for Altered Immune Competence
3 lecture hours. 3 credits. Prerequisite: NURS 504 or permission of instructor. Analyzes concepts and factors related to the phenomenon of immune incompetence. Examines the contribution of advanced nursing practice to patient outcomes in selected clinical problems such as infection, malignancy, hypersensitivity, autoimmunity, transplantation and HIV infection. Evaluates clinical problems from both a theoretical and clinical perspective, incorporating biological, psychosocial, ethical, cultural and health systems aspects.

NURS 677 Advanced Primary Care of Families
1-3 lecture hours. 1-3 credits. Prerequisites: NURS 501, NURS 503, NURS 504, NURS 511, NURS 512, NURS 647, NURS 648 and NURS 633. Addresses the synthesis of theoretical and research bases for advanced nursing practice with families. Focuses on the care of the individual and their family throughout the life span and across the health continuum, with special emphasis on the advanced evaluation of families and their health needs.

NURS 672 Child Practicum I
1-3 credits (45 clinical hours per credit). May be repeated. Prerequisites: NURS 501, NURS 503, NURS 504 and NURS 511. Pre- or corequisites: NURS 502, NURS 647 and NURS 648. Focuses on the synthesis of theory and application and evaluation of knowledge related to the primary care of children. Emphasis on beginning skill in assessment of well children and common acute problems of children and adolescents. Major focus on assessment. Student expected to be able to deliver well child care in conformance with standards of care and close preceptor involvement. Expected to develop skill in pediatric history taking, developmental assessment and physical assessment and beginning skill in management of selected conditions. Develops beginning skill in management of common well child and behavioral issues. Clinical placements with preceptor(s) made by faculty based on area of role preparation declared by student.

NURS 673 Child Practicum II
1-3 clinical hours. 1-3 credits (45 clinical hours per credit). Prerequisites: NURS 501, NURS 503, NURS 504, NURS 511, NURS 647, NURS 648 and NURS 672. Pre- or corequisite: NURS 502. Focuses on the synthesis of theory and application and evaluation of knowledge related to the care of children; builds on previously developed assessment skills. Adds assessment of adolescent gynecology and sexuality. Student increases ability to manage more complex behavioral and well child issues. Student is expected to manage a wide variety of acute pediatric conditions with moderate preceptor input. Clinical placements with preceptor(s) made by faculty based on area of role and preparation declared by student.

NURS 674 Child Practicum III
1-4 clinical hours. 1-4 credits (45 clinical hours per credit). Prerequisites: NURS 501, NURS 502, NURS 503, NURS 504, NURS 511, NURS 647, NURS 648 and NURS 673. Pre- or corequisites: NURS 508, NURS 512, NURS 601 and NURS 649. Focuses on advanced clinical management of children in a variety of care settings. Student refines both assessment and management skills, requiring minimal preceptor input by the end of the semester. Extends skills to the management of children and their families dealing with chronic illness. Manages a wide range of complex well child and behavioral issues as well as children with a wide variety of acute illnesses. Clinical placements with preceptor(s) made by faculty based on area of role preparation declared by student.

NURS 675 Adult Immunocompetence Practicum I
1-3 clinical hours. 1-3 credits. May be repeated. Prerequisite: NURS 501, NURS 661, NURS 511, or with permission of instructor. Focuses on the synthesis, application, and evaluation of knowledge for providing advanced acute health care to a target population of adults with actual or potential problems associated with alternations in immunocompetence. Emphasis is on the development of research and theory based advanced nursing practice. Provides opportunities for achievement of competencies in advanced nursing practice through faculty supervised clinical experiences with a preceptor. Practicum is planned in relationship to the student’s area of interest and role preparation. Practicum is repeated in order to achieve the achievement of competencies with a designated adult population and at a more advanced level.

NURS 676 Adult Primary Practicum
90-270 clinical hours. 2-6 credits. May be repeated. Pre- or corequisites: NURS 502, NURS 511, NURS 661. Focuses on the synthesis of theory and application and evaluation of this knowledge with a target population in a variety of primary care settings. Provides opportunities for achievement of intermediate competencies in advanced nursing practice through faculty supervised clinical experiences with a preceptor. Practicum is planned in relation to the student’s area of interest and role preparation. May be repeated to obtain sufficient practicum hours for certification.

NURS 677 Advanced Adult Primary Practicum
90-255 clinical hours. 2-5 credits. Prerequisite: NURS 676. Focuses on advanced clinical management of a patient population in a selected acute care setting. Provides opportunities for achievement of final competencies in advanced nursing practice through supervised clinical experiences with a preceptor. Performance at the advanced level is required. Provides the opportunity to plan the practicum in relation to the student’s clinical area of interest and role preparation.

NURS 678 Adult Acute Practicum
90-270 clinical hours. 2-6 credits. May be repeated. Prerequisites: NURS 502, NURS 511, NURS 661. Focuses on the synthesis of theory and application and evaluation of this knowledge with a target population in a variety of acute care settings. Provides opportunities for achievement of intermediate competencies in advanced nursing practice through faculty supervised clinical experiences with a preceptor. Allows for the practicum to be planned in relation to the student’s area of interest and role preparation. May be repeated to obtain sufficient practicum hours for certification.

NURS 679 Adult Acute Practicum
90-225 clinical hours. 2-5 credits. Prerequisite: NURS 677. Focuses on advanced clinical management of a patient population in a selected acute care setting. Provides opportunities for achievement of final competencies in advanced nursing practice through supervised clinical experiences with a preceptor. Performance at the advanced level is required. Gives the opportunity to plan the practicum in relation to the student’s clinical area of interest and role preparation.

NURS 680 Leading People
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 655 or permission of instructor. Examines the effective leadership and application of management theory and skills in the development of a high performing group of both professional and support staff within health care. Examines issues related to cultural diversity and empowerment for optimal performance within the complex urban health care setting.

NURS 681 Nurses as Organizational Leaders
Semester course; 3 lecture hours. 3 credits. Prerequisite: Admission to the graduate program or permission of instructor. Explores organizational and individual factors that influence nursing leadership and administrative roles. Analyzes the relationships among major organizational variables and stakeholders and their impact on the design and management of a nursing department.

NURS 682 Women’s Practicum I
1-4 credits (45 clinical hours per credit). May be repeated. Prerequisites: NURS 502, NURS 511, NURS 632 and NURS 633. Focuses on the beginning synthesis of theory and application of advanced nursing practice and evaluation of knowledge with a target population of women, including well-women gynecologic and health promotion care, management of uncomplicated acute gynecologic needs/problems of women, and diagnosis and management of uncomplicated prenatal and postnatal care. Care of commonly encountered needs/problems of women is based on standards of AWHONN and ACOG. Provides opportunities for achievement of beginning competencies in advanced nursing practice with women through supervised clinical experiences with a qualified women’s health care preceptor. Allows for the practicum to be planned in relation to the student’s area of interest in women’s health and role preparation (nurse practitioner or clinical nurse specialists).

NURS 683 Women’s Practicum II
1-4 clinical hours. 1-4 credits (45 clinical hours per credit). May be repeated. Prerequisites: NURS 502, NURS 511, NURS 632 and NURS 633. Focuses on the beginning synthesis of theory and application of advanced nursing practice and evaluation of knowledge with a target population of women, including well-women gynecologic and health promotion care, management of uncomplicated acute gynecologic needs/problems of women, and diagnosis and management of uncomplicated prenatal and postnatal care. Care of commonly encountered needs/problems of women is based on standards of AWHONN and ACOG. Provides opportunities for achievement of beginning competencies in advanced nursing practice with women through supervised clinical experiences with a qualified women’s health care preceptor. Allows for the practicum to be planned in relation to the student’s area of interest in women’s health and role preparation (nurse practitioner or clinical nurse specialists).
of intermediate and advanced competencies in advanced practice nursing with women through supervised clinical experiences with a qualified women's health care preceptor. Allows for the practicum to be planned in relation to the student's area of interest in women's health and role preparation (nurse practitioner or clinical nurse specialist). Selected experiences will be explored focusing on teaching, case management, and leadership.

NURS 684 Family Practicum
1-4 clinical hours. 1-4 credits (45 clinical hours per credit). Prerequisites: NURS 647, NURS 648, NURS 661, NURS 652, NURS 672, NURS 676, NURS 682 and NURS 670. Pre- or corequisite: 2 credits of this practicum can be taken in the summer immediately preceding NURS 670 with the consent of the student's adviser. The remaining 2 credits must be taken concurrently in the following fall semester. Focuses on the achievement of final clinical objectives for the concentration. Provides opportunities for achievement of these competencies as an advanced practice nurse in the family concentration through faculty-supervised clinical experiences with a preceptor.

NURS 685 Women's Practicum III
Semester course; 45 clinical hours per credit. 1-5 credits. May be repeated. Prerequisite: NURS 603. Focuses student for the transition to advanced practice by applying knowledge in the care of women. Care of conditions in women is based on standards of AWHONN and ACOG. Provides opportunities for achievement of advanced competencies in advanced practice nursing with women through supervised clinical experiences with a qualified women's health care preceptor. Allows for practicum to be planned in relation to the student's area of interest and role preparation (nurse practitioner or clinical nurse specialist). Selected experiences will be explored focusing on teaching, case management and leadership. Graded as pass/fail.

NURS 686 Emerging Clinical Issues in Patient Management
Semester course; 45 clinical hours. 4 credits. Prerequisites: Admission to the Adult Health Acute Care CNS concentration or permission of the instructor; NURS 501, NURS 508 and NURS 512. Examines the role and function of the clinical nurse specialist in identifying and responding to emerging issues in the delivery of care to patients in the student's area of specialization.

NURS 687 Management Systems and Health Care Outcomes
Semester course; 45 clinical hours. 4 credits. Prerequisites: NURS 508 and permission of instructor. Focuses on the effective management of human, material and fiscal resources in institutional environment. Evaluates selected approaches to assessing the quality of nursing and patient outcomes using information technology. Examines the role of organizing and synthesizing clinical and administrative data to support decision making. Takes a comprehensive approach to program and business planning.

NURS 688 Perinatal Practicum
1-3 clinical hours. 1-3 credits (45 clinical hours per credit). Focuses on the application of theory and the clinical management of high-risk perinatal families. Addresses the application of nursing process by the advanced practice nurse to individuals and families experiencing complex problems during the perinatal period. Provides the opportunity to augment prior clinical skills and experiences related to management of perinatal clients.

NURS 689 Integrative Systems Practicum
3-6 lecture hours. 3-6 credits. Prerequisite: Permission of instructor. Focuses on the application of nursing knowledge within the integrative systems specialties with a targeted population in a variety of settings. These settings may include health care and community organizations. Provides opportunities for achievement of competencies in advanced nursing practice through faculty-supervised clinical experiences with a preceptor. Allows for the practicum to be planned in relation to the student's area of interest and role preparation. Focuses on the evaluation of specific outcomes determined by the faculty and the preceptor. The student is required to complete an organizational assessment including plans for further data collection and analysis and delineation of personal leadership roles that the student assumes in implementing the change. Provides opportunities for achievement of competencies in advanced nursing practice through faculty-supervised administration and leadership experiences with a preceptor. Allows for the practicum to be planned in relation to the student's area of interest and role preparation. Focuses on the evaluation of specific outcomes determined by the faculty and student.

NURS 690 Application for Financial Concepts
Semester course; 4 lecture hours. 4 credits. Prerequisite: NURS 508 or permission of instructor. Provides an understanding of financial concepts for nurse leaders and includes the application of financial principles to health care organizations and the impact of these applications on patient outcomes.

NURS 691 Nursing Research Practicum
3 laboratory hours. 3 credits. Prerequisite: Permission of instructor required. Participates in ongoing research. Implements research with faculty direction and supervision.

NURS 692 Integrative Administrative Systems Practicum I
Semester course; 45 clinical hours per credit. 3 credits. Prerequisite: Permission of instructor. Focuses on the application of nursing knowledge in a variety of settings within the integrative systems specialty of Nursing Administrative and Leadership. Practicum focuses on the execution of the plan for the selected organizational project. Provides opportunities for achievement of competencies in advanced nursing practice through faculty-supervised administration and leadership experiences with a preceptor. Focuses on the development of the selected organizational project. The student will identify the necessary skills and competencies appropriate to implementing the plan. Provides opportunities for the execution of the plan. Focuses on the evaluation of specific outcomes determined by the faculty and student.

NURS 694 Integrative Administrative Systems Practicum III
Semester course; 45 clinical hours per credit. 4 credits. Prerequisite: NURS 693. Focuses on the application of nursing knowledge in a variety of settings within the integrative systems specialty of Nursing Administrative and Leadership. Practicum focuses on the execution of the plan for the organizational project. Provides opportunities for achievement of competencies in advanced nursing practice through faculty-supervised administration and leadership experiences with a preceptor. Focuses on the development of the selected organizational project. The student will identify the necessary skills and competencies appropriate to implementing the plan. Provides opportunities for the execution of the plan. Focuses on the evaluation of specific outcomes determined by the faculty and student.

NURS 703 Philosophy of Human Sciences
3 lecture hours. 3 credits. Prerequisite: Admission to the doctoral program. Critically analyzes philosophic perspectives and their relationship to human sciences; emphasizes analysis of the underlying epistemology and ontological assumptions of various philosophies. Explores philosophies of science and their influence on the emergence of knowledge in the human sciences, using nursing science as an example.

NURS 704 Theoretical Structures for Nursing Knowledge
3 lecture hours. 3 credits. Prerequisite: Admission to the doctoral program. Critically analyzes philosophic perspectives and their relationship to human sciences; emphasizes analysis of the underlying epistemology and ontological assumptions of various philosophies. Explores philosophies of science and their influence on the emergence of knowledge in the human sciences, using nursing science as an example.

NURS 705 Theory Construction in Nursing
3 lecture hours. 3 credits. Prerequisite: Admission to the doctoral program. Critically analyzes philosophic perspectives and their relationship to human sciences; emphasizes analysis of the underlying epistemology and ontological assumptions of various philosophies. Explores philosophies of science and their influence on the emergence of knowledge in the human sciences, using nursing science as an example.

NURS 720 Foundations of Biobehavioral Clinical Research
Semester course; 3 lecture hours. 3 credits. Prerequisite: Admission to the doctoral program. Focuses on the use of biobehavioral research to improve nursing practice and the scholarship of the discipline and theoretical groundwork for dissertation research.
NURS 721 Biobehavioral Measures in Clinical Research
Semester course; 3 lecture hours. 3 credits. Focuses on the application of biobehavioral measures in clinical research. Includes understanding theoretical foundations of measures as well as assessment of accuracy and precision of measures. Emphasizes principles of function, development and outcomes. Examples include clinical, observational and biological measures.

NURS 730 Systems Science in Health Care
3 lecture hours. 3 credits. Focuses on the interrelationships among groups, organizations and communities within the larger societal context. Examines philosophies, theories, methodologies and applications as they apply to understanding systems. Provides the foundation for conceptual model building and application of systems principles to specific health care problems, situations and organizations.

NURS 740 Theoretical Perspectives in Healing
3 lecture hours. 3 credits. Critically analyzes paradigmatic and theoretical perspectives related to healing processes. Using collaborative inquiry, explores models of healing. Describes the centrality of healing in relation to individuals, communities, cultures and organizations. Offers frame of reference for students to pursue a program of inquiry within the domain of healing.

NURS 742 Unitary-transformative Dimensions of Healing
3 lecture hours. 3 credits. Presents an overview of the critical elements and assumptions of a unitary-transformative perspective and its relevance for a science and art of healing. Describes the development and evolution of the unitary-transformative paradigm through thinking processes as examples. Employs unitary science to contextualize evolving healing theory and practice. Engages students in developing conceptual and theoretical thinking to inform programs of healing inquiry.

NURS 750 Risk and Resilience Across the Life Span
3 lecture hours. 3 credits. This course explores risk and resilience from a theoretical perspective across the life span drawing on nursing and related disciplines. The emphasis is on theoretical perspectives, critical analyses of measurement strategies, and applications to research and practice.

NURS 760 Foundations of Immunocompetence
3 lecture hours. 3 credits. Provides in-depth study of immunocompetence as a phenomenon critical to the development of nursing science. Focuses on the biological and developmental basis for immunocompetence, multidimensional relationships among the immune and other physiological and psychological phenomena and the consequences of alterations in immunocompetence. Examines the theoretical basis for interventions designed to influence alterations in immunocompetence. Analyzes methodology and research design issues related to the study of immunocompetence.

NURS 761 Research and Practice in Psychoneuroimmunology
3 lecture hours. 3 credits. Prerequisites: graduate standing with at least one major course in immunocompetence, neuroscience, immunology and foundations of psychoneuroimmunology, Ph.D. In nursing students must also complete NURS 760. This course is designed to explore psychoneuroimmunology (PNI) as a field of study and as a potential paradigm for both basic research and health-related research and practice. Emphasizes will include the psychophysiological processes underlying PNI, methodological issues and approaches for PNI-based research and applications of the PNI framework within the health-related disciplines.

NURS 770 Quantitative Research Design
3 lecture hours. 3 credits. Prerequisite: NURS 773, BIOS 543 and BIOS 544. Provides advanced knowledge and skills for critical decision making in the design and implementation of quantitative health care research. Analyzes various quantitative research designs regarding ability to address phenomena of concern to nursing or health care. Presents a range of strategies and substantive knowledge for scientists to launch programs of quantitative inquiry.

NURS 771 Instrument Development
2 lecture and 1 laboratory hours. 3 credits. Prerequisites: SOCY/STAT 508 or SOCY/STAT 608 (or equivalent). This course is open to non-nursing students with permission of the instructor. Focuses on theoretical foundations underlying development and psychometric evaluation of instruments measuring psychosocial phenomena. Provides simulated experiences scale construction as well as hands-on statistical evaluation of relevant measurement properties.

NURS 772 Qualitative Research Design
3 lecture hours. 3 credits. Prerequisite: NURS 773 or permission of the instructor. Provides advanced knowledge and skills for critical decision making in the design and implementation of qualitative health care research. Provides a context for the study of phenomena of concern to the individual and discipline through scholarly debate, dialogue and reflection. Presents range of strategies and substantive knowledge for scientists to launch programs of qualitative inquiry.

NURS 773 Perspectives on Research Design
3 lecture hours. 3 credits. Pre- or corequisites: NURS 703, NURS 704, NURS 705, or permission of instructor. Analyzes philosophical foundations of a variety of research designs. Explores assumptions underlying the selection and evaluation of quantitative and qualitative designs. Focuses on the epistemological, ontological and methodological foundations of research design.

NURS 774 Qualitative Data Analysis
3 lecture hours. 3 credits. Pre- or corequisites: NURS 773 and 772. Provides advanced knowledge and skills for qualitative data analysis. Approaches qualitative analysis from an analytical perspective of theoretical and methodological perspectives. Provides opportunity in analyzing qualitative data.

NURS 775 The Ethnographic Approach to Knowledge Generation in Nursing
3 lecture hours. 3 credits. Pre- or corequisites: NURS 772 and 774. A critical exploration of ethnography as a qualitative approach for studying nursing phenomena and generating nursing knowledge from a cultural perspective. Includes the critique of the epistemological, philosophical and ontological understandings of ethnography and an in-depth description of the traditional method. Evolving approaches for conducting ethnographic research will be discussed.

NURS 776 Research Program Development Seminar I
Seminar course; 2 seminar hours. 1 credit. Explores the multiple roles in establishing a program of research and the various career development stages of a scholar. Defines an area of inquiry for knowledge development within a focus area.

NURS 777 Research Program Development Seminar II
Seminar course; 2 seminar hours. 1 credit. Prerequisite: NURS 776. Explores knowledge development in a selected area of inquiry and the resources and strategies useful in establishing a program of research.

NURS 778 Research Program Development Seminar III
Seminar course; 2 seminar hours. 1 credit. Prerequisite: NURS 777. Focuses on collaboration within the research team and in the larger research community, leadership in the research team, the peer review process and knowledge dissemination.

NURS 780 Patient Care Systems and Patient Outcomes
3 lecture hours. 3 credits. Prerequisite: NURS 508 or equivalent, or permission of instructor. Examines administrative and regulatory systems relevant to systems of patient care. Focuses on the approaches, including program evaluation, for measuring patients outcomes affected by nursing and multidisciplinary collaboration.

NURS 781 Organizational Analysis in Nursing
3 lecture hours. 3 credits. Prerequisite: NURS 508, 681 or equivalent (i.e., graduate course in organizational theory); or permission of instructor. Analyzes current paradigms and new perspectives in guiding nursing systems research. Evaluates concepts and theoretical models that attempt to explain organizational functioning and that are of particular usefulness in developing a substantive body of knowledge.

NURS 782 Analysis of Health Care Policy as a Factor in Nursing Practice
3 lecture hours. 3 credits. Analyzes global and national issues in health care policy. Applies traditional and emerging models to policy issues. Examines policies having implications for nursing practice research and administration. Focuses on the environment of health care policy development, the agencies and leadership of policy development and implementation, and nursing's role in policy development, implementation, and evaluation.

NURS 791 Special Topics
3-6 credits. May be repeated. Prerequisite: Admission to doctoral program and permission of instructor. Explores specific topics in nursing.

NURS 792 Directed Study in Nursing
Variable hours. 1-6 credits. Course may be repeated. A minimum of 3 credits is required as a substitute for a required focus of inquiry course. A maximum of 6 credits is allowed. Prerequisites: Admission to doctoral program and permission of instructor. Independent study in specific area of nursing developed under the supervision of a member of the graduate faculty. Graded as pass/fail.
NURS 796 Directed Research
Variable hours. 1-6 credits. May be repeated. A minimum of 5 credits is required. Provides a mentored research experience in a selected area of inquiry or research methodology within the context of student’s selected focus area. Graded as “S,” “U” or “F.”

NURS 797 Research Practicum
Variable clinical hours. 1-6 credits. May be repeated. A minimum of 3 credits is required. Provides a mentored research experience in areas of faculty research expertise. Graded as “S,” “U” or “F.”

NURS 798 Thesis
6 credits. The master’s thesis constitutes carefully planned and executed research under the supervision of an adviser and in conjunction with a thesis committee. The student writes and presents the required thesis in the area of clinical nursing interest.

NURS 898 Dissertation
Variable hours. 1-12 credits. A minimum of 12 credits is required. Prerequisite: Admission to candidacy. Original research conducted under the supervision of an adviser and in conjunction with a dissertation committee.
School of Pharmacy

Medicinal Chemistry

MEDC 310/CHEM 310 Medicinal Chemistry and Drug Design
Semester course; 3 lecture hours. 3 credits. Prerequisite: One year of organic chemistry. This course is designed to expose undergraduate chemistry, biology and pre-medicine majors to the history, theory and practice of medicinal chemistry. The course will emphasize a combination of fundamentals and applications of drug design. In particular, the molecular aspects of drug action will be discussed. Special emphasis will also be placed on the methods used by medicinal chemists to design new drugs.

MEDC 501 Medicinal Chemistry I
Short course; 4 lecture hours per week for 8 weeks. 2 credits. This course integrates the chemical and physical properties of organic molecules with biological effects. Particular emphasis is placed on heterocyclic chemistry, mechanisms of drug decomposition, mechanistic mechanisms, and stereochemistry as they relate to drug action and biodisposition. Molecular physico-chemical phenomena are described which pertain to biological events.

MEDC 526 Research Techniques in Medicinal Chemistry
Semester course; 0-2 lecture and 2-8 laboratory hours. 1-4 credits. The theory and application of classical, instrumental, and computer techniques used in medicinal chemistry research are presented.

MEDC 532 Medicinal Chemistry for Nurse Anesthetists
Semester course; 3 lecture hours. 3 credits. A review of the principles of organic chemistry and bio-organic chemistry presented as a series of lectures covering the structure-activity relationships, metabolism, and mechanism of action of selected agents.

MEDC 541 Survey of Molecular Modeling Methods
Semester course; lecture and laboratoryhour. 1 credit. Provides computational chemistry and molecular graphics with the current software used for drug design and small molecule/large molecule interactions. Computations chemistry problems will be emphasized in the laboratory.

MEDC 591 Special Topics in Medicinal Chemistry
Semester course; 1-3 credits. An elective course in which students may choose to participate in individual or group study in one or more areas of medicinal chemistry. The course can take the form of formal lectures, informal group discussions, literature research, and/or laboratory research. Students must have the permission of the individual instructor before registering for this course.

MEDC 601 Advanced Medicinal Chemistry I
Semester course; 1 lecture hour. 1 credit. Introduces the general concepts important in medicinal chemistry, including drug dynamics, drug macromolecule interactions, drug design and quantitative structure-activity relationships.

MEDC 602 Principles of Pharmaceutical Analysis
Semester course; 1.5 lecture and 1 laboratory hours. 2 credits. A study of the underlying principles and practical limitations of analytical procedures with emphasis on techniques most applicable to the analysis of substances in biological fluids. The laboratory work usually involves the testing and evaluation of over-the-counter analytical products currently sold or under clinical trials. Emphasis is also placed on the clinical applications and interpretations of measuring endogenous and exogenous chemicals present in biological fluids. This course includes material related to both statistics and ethics.

MEDC 603 Medicinal Chemistry II
Semester course; 2.5 lecture hours. 2.5 credits. A study of the general principles of drug action at the molecular-level. Emphasis is placed on classical, chemical, and biochemical properties of drug substances, the relationships between chemical structure and pharmacological activity, the molecular basis for drug-receptor interactions, and drug metabolism. A major goal is to prepare students so that they may more readily assimilate and apply new information about existing and future therapeutic agents.

MEDC 604 Medicinal Chemistry III
Semester course; 2.5 lecture hours. 2.5 credits. Prerequisite: MEDC 603. A study of the general principles of drug action at the molecular-level. The philosophy and goals of MEDC 603 are applied to the discussion of therapeutic classes of agents not covered in MEDC 603.

MEDC 610 Advanced Medicinal Chemistry I
Semester course; 2 lecture hours. 2 credits. Prerequisite: MEDC 601 or permission of instructor. The course introduces concepts for understanding the medicinal chemistry of the central nervous system.

MEDC 614/PCEU 614/PHAR 614 Research Techniques
Semester course; variable hours. Variable credit. Credit will be given on the basis of 1 credit per 45 hours of laboratory time. Prerequisite: Approval of research adviser. Provides new graduate student with the laboratory skills necessary to perform research in the chosen discipline. The training time required will depend upon the discipline. Graded as pass/fail.

MEDC 620 Advanced Medicinal Chemistry II
Semester course; 2 lecture hours. 2 credits. Prerequisite: MEDC 601 or the permission of the instructor. Reviews the concepts necessary for enzyme inhibitor design. Emphasizes the design of new agents to treat disease states by enzyme inhibition.

MEDC 630 Theoretical Methods in Drug Design
Semester course; lecture and laboratory hours. 2 credits. Prerequisites: MEDC 601, MEDC 610 or MEDC 620, or permission of instructor. A study of the theoretical methods of drug structure-activity analysis, including molecular orbital theory, topological indices and physical property correlations. Computational chemistry problems will be emphasized in the laboratory.

MEDC 640 Nucleoside, Nucleotide, Carbohydrate and Peptide Chemistry
Semester course; 1 lecture hour. 1 credit. Surveys nucleoside, nucleotide, carbohydrate and peptide chemistry with emphasis on their synthesis.

MEDC 643 Regioselective Drug Metabolism
Semester course; 1 lecture hour. 1 credit. Surveys drug biotransformation reactions. Emphasizes the molecular aspects of Phase I and Phase II drug metabolism.

MEDC 644 Asymmetric Synthesis
Semester course; 1 lecture hour. 1 credit. Reviews the major asymmetric chemical transformations, including mechanisms, scope and synthetic utility.

MEDC 645 Introduction to Heterocyclic Chemistry
Semester course; 1 lecture hour. 1 credit. Introduces the chemistry of heterocyclic compounds. Emphasizes heterocyclic nomenclature and the reactions/reactivity of heterocyclic systems.

MEDC 670 Advanced Molecular Modeling Theory and Practice
Semester course; 3 lecture/laboratory hours. 3 credits. Prerequisite: MEDC 641 or permission of instructor. Examines the principles and application of computational chemistry and molecular graphics to current problems in drug design. Lectures focus on the application of specific computational methods and techniques to solve problems in drug/molecular design. Workshop sessions provide hands-on experience using state-of-the-art hardware and software for molecular modeling.

MEDC 690 Departmental Research Seminar
Semester course; 1 lecture hour. 1 credit. Reports presented by students, staff, and visiting lecturers, current problems and developments in pharmaceutical and medicinal chemistry are discussed.

MEDC 691 Special Topics in Medicinal Chemistry
Semester course; 1-4 lecture hours. 1-4 credits. Lectures, tutorial studies, and/or library assignments in selected areas of advanced study not available in other courses or as a part of the research training.

MEDC 697 Directed Research in Medicinal Chemistry
Semester course; 1-15 credits. Research leading to the M.S. or Ph.D. degree.

Pharmaceutics

PCEU 503 Principles of Pharmacy
Semester course; 4 lecture hours. 4 credits. A study of the chemical and physico-chemical principles fundamental to the development and use of medication dosage forms. Topics discussed include pharmaceutical calculations, prescription orders, weights and measures, theory of solutions, official waters, solution stabilizing agents and preservatives, viable products, and ophthalmic products. In addition, there are lectures on descriptive and inferential statistics and pharmaceutical quality control.
PCEU 506 Biopharmaceutics and Pharmacokinetics  
Semester course; 3 lecture and 1 conference hours. 4 credits. This course describes drug and dosage form stability and linear pharmacokinetics, to include discussion of compartmental modeling, physiological concepts of pharmacokinetics, and clearance and absorption. The course includes material related to statistics. Also, this course describes the physico-chemical and biopharmaceutical principles, fundamental to the development of pharmaceutical dosage forms including disperse systems, semi-solids, solids and novel drug delivery systems. Formulation, manufacture, control and relevant pharmacist interactions will be addressed.

PCEU 517 Pharmacy Skills Laboratory I  
Semester course; 3 laboratory hours. 1 credit. This competency-based course includes an introduction to medication distribution systems, prescription dispensing, patient counseling and monitoring, compounding solution drug preparations and drug information retrieval. Graded as honors or pass/fail.

PCEU 518 Pharmacy Skills Laboratory II  
Semester course; 3 laboratory hours. 1 credit. This competency-based course includes an introduction to IV infusion systems and pumps, the preparation of sterile products, a continuation of medication distribution systems and compounding semi-solid and solid dosage forms. Graded as honors or pass/fail.

PCEU 602 Advanced Pharmaceutical Product Development  
3 lecture and 4-10 laboratory hours. 5-8 credits. A continuation of PHAR 601.

PCEU 604 Biotechnology and Pharmacy  
Semester course; 1 lecture hour and 1 self-paced DNA isolation and identification laboratory. 2 credits. The student’s basic biochemistry and pharmacy education will be expanded to include the newest concepts in molecular medicine, pharmacogenetics, pharmacogenomics, biochemistry, molecular biology, analytical techniques, drug development, delivery and formulation relevant to the use and development of biotechnology-derived products, including protein- and nucleic acid-based pharmaceuticals.

PCEU 605 Biopharmaceutics and Pharmacokinetics  
Semester course; 2-5 lecture hours. 2-5 credits. This course describes the physico-chemical and biopharmaceutical principles, fundamental to the development of pharmaceutical principles, fundamental to the development of pharmaceutical dosage forms including disperse systems, semi-solids, solids and novel drug delivery systems. Formulation, manufacture, control and relevant patient-pharmacist interactions will be addressed.

PCEU 606 Applied Pharmacokinetics  
Semester course; 2 lecture and 1 conference hours per week. 2.5 credits. This course extends the concepts of pharmacokinetics as applied to the design and implementation of pharmacokinetic variability, drug interactions, and statistical strategies for individualization of drug therapy.

PCEU 607-608 Introduction to Pharmaceutical Sciences  
Continuous courses; 2 credits offered. 1 credit hour in fall and spring. Students will be introduced to the drug discovery process, learn about drug development from drug design to drug approval. Each topic will be introduced either by a faculty member of an expert from the pharmaceutical industry. Didactic sessions are followed by guided discussions. Discussion sessions may involve more than one faculty member and utilize specific examples to illustrate the topics.

PCEU 612 Advanced Physical Pharmacy and Biopharmaceutics  
Semester course; 3 credits. Phase equilibria and phase transfer kinetics related to biopharmaceutics will be covered. The relationship between physiochemical properties of a drug dosage form and drug absorption, along with the correlation between in vitro tests used to evaluate dosage forms an in vitro measures of drug absorption will be covered. The course assumes that the student has a basic understanding of pharmacokinetics, physical chemistry and statistics.

PCEU 614/MEDC 614/PHAR 614 Research Techniques  
Semester course; variable hours. Variable credit. Credit will be given on the basis of 1 credit per 45 hours of laboratory time. Prerequisite: Approval of research adviser. Provides new graduate student with the laboratory skills necessary to perform research in the chosen discipline. The training time required will depend upon the discipline. Graded as pass/fail.

PCEU 617 Pharmacy Skills Laboratory III  
Semester course; 3 laboratory hours. 1 credit. This competency-based course includes patient counseling and analysis of patient self-monitoring self-dosing devices, detection of errors and omissions in prescription dispensing, reading patient charts and taking medication histories, taking telephone prescriptions, and compounding total parenteral nutrition solutions. Graded as pass/fail.

PCEU 622 Clinical Pharmacokinetics  
Semester course; 2 lecture and 2 laboratory hours. 3 credits. The application of current pharmacokinetic theory to clinical problems involved in optimizing and monitoring drug use in patients. Particular attention is given to adjustment of drug dosage in individual patients with impaired drug elimination due to renal and hepatic dysfunction. (Nontraditional program)

PCEU 624 Pharmacokinetics  
Semester course; 3 lecture hours. 3 credits. An advanced treatment of the kinetics of drug absorption, distribution, and elimination utilizing mathematical models, and digital computers for analysis of linear and nonlinear biologic systems.

PCEU 625 Pharmaceutical Analysis  
Semester course; 1 lecture and 1 laboratory hours. 2 credits. Theory and practice of selected analytical techniques for the quantitative determination of drugs in body fluids and other matrices. Emphasis is on method validation, and immunoassay methodologies. Laboratory sessions will provide “hands on” experience with modern methods of drug analysis.

PCEU 626 Pharmaceutical Analysis Laboratory  
1 lecture hour. 1 credit. Prerequisite: PHAR 625. A continuation of PHAR 625 with emphasis on providing advanced topics for analysis of drugs and metabolites.

PCEU 690 Pharmaceutics Research Seminar  
Semester course; 1 lecture hour. 1 credit. Required of all graduate students in pharmaceutics. Research Seminar.

PCEU 691 Special Topics in Pharmaceutics  
Semester course; 1-5 lecture hours. 1-5 credits. Presentation of subject matter is by lectures, tutorial studies, and/or library assignments in selected areas of advanced study not available in other courses or as part of the training in research.

PCEU 697 Directed Research in Pharmaceutics  
Semester course; 1-15 credits. Research leading to the M.S., Pharm.D., or Ph.D. degree.

Pharmacy

PHAR 502 Pharmacotherapeutics  
Semester course; 2 lecture hours. 2 credits. Prerequisite: PHIS 501. Focus on the application of basic pharmacotherapeutic principles of drug categories to patient management.

PHAR 504 Pharmacotherapeutics in Physical Therapy  
Semester course; 1 lecture hour. 1 credit. Introduces pharmacotherapeutics for physical therapy students. Emphasizes the safe and appropriate use of drugs in the prevention and treatment of disease. Focuses on the principles and concepts of drug action and therapeutic indications for drugs and drug classes in didactic presentations. Includes the effects of medications on physical functions when appropriate.

PHAR 521 Pharmacy and the U.S. Health Care System  
Semester course; 2.5 credits. This course introduces students to the American health care system and acquaints them with the features of that system that directly influences the practice of pharmacy and the provision of pharmaceutical care. The course pays particular attention to pharmacy as a profession, the practice of pharmacy, and the delivery of pharmaceutical care in a complex environment by considering the structure, function, and associated policy considerations of the health care delivery system. The course also provides a general overview of the health care delivery system. The course also provides a general overview and an intensive analysis of interrelationships among health care consumers, providers, organizational arrangements, and regulatory and reimbursement mechanisms. The course includes material related to statistics and ethics.

PHAR 525 Communications in Pharmacy Practice  
Semester course; 1.5 lecture hours and an average of 1 conference hour per week. 2 credits. A study of the theory and techniques of communication and counseling techniques related to pharmacy practice. Supervised
practice in developing basic communication skills.

PHAR 557, 558 Pharmacy Practicum I, II Semester courses; 6 conference hours, 14 experiential hours per semester. 0.5 credit. These courses are the first of a six-semester sequence. Students will have direct contact with patients and pharmacy practice sites to allow understanding of the effect of illness and medication on patients and the impact of pharmacy services. Graded as honors or pass/fail.

PHAR 608 Clinical Radiopharmacy Semester courses; 1 lecture and 2 laboratory hours, 2 credits. Students receive training in the safe use, preparation, calibration, quality control, and clinical diagnostic use of current and investigational radiopharmaceuticals in nuclear medicine practice. Emphasis will be placed on obtaining patient medication histories, for the evaluation of agents capable of in-vivo and in-vitro isotopic test modification.

PHAR 614/PECU 614/MEDC 614 Research Techniques Semester course; variable hours. Variable credit. Credited will be given on the basis of 1 credit per 45 hours of laboratory time. Prerequisite: Approval of research adviser. Provides new graduate student with the laboratory skills necessary to perform research in the chosen discipline. The training time required will depend upon the discipline. Graded as pass/fail.

PHAR 626 Advanced Pharmacotherapy Research Methods Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of the instructor. This course focuses on research techniques used to assess the clinical response to drug therapy, including advantages and disadvantages of different techniques. Published clinical trials are evaluated to illustrate these concepts including statistical assessment. Recent FDA New Drug Applications are reviewed when appropriate to illustrate regulatory aspects of the evaluation of clinical trials.

PHAR 627 Principles of Pharmacy Practice Management Semester course; 4.5 lecture hours, 4.5 credits. This course describes social, behavioral, and financial theories pertinent to the management of pharmacy practices in community, hospital and other settings. Emphasis will be placed on marketing and pharmaco-economic concepts applied to the practice of pharmacy.

PHAR 631 Advanced Pharmacy Practice Management Semester course; 3 lecture hours. 3 credits. Classical, social, and systems views of management are introduced with emphasis on the uses of implicit control. The sociology of professions and the nature of professional work are explored; the management of the professional pharmacy work is refined in detail. Design and operation of integrated drug information, drug distribution, and drug use control systems is explored. (Nontraditional program).

PHAR 632 Advanced Hospital Pharmacy Management II Semester course; 3 lecture hours. 3 credits. The planning and development of a total program in institutional drug use control is stressed with emphasis on modern human and fiscal resource management theories and applications. Current management problems unique to institutional pharmacy practice are stressed.

PHAR 635 Advanced Pharmacotherapeutics I Semester course; 3 lecture and 6 laboratory hours, 5 credits. The rational therapeutic choices of drugs with respect to pathophysiological considerations of diseases are emphasized. Clinical application of biopharmaceutics, pharmacokinetics, therapeutics, drug interactions, adverse drug reactions, laboratory findings, and other factors affecting drug efficacy in the context of the total care of the patient is stressed. Detection, clinical evaluation and management of adverse drug reactions also is emphasized. Students receive advanced instruction in therapeutics and pathophysiology and learn to apply drug knowledge to problem solving using selected patient cases. (Nontraditional program)

PHAR 636 Advanced Pharmacotherapeutics II Semester course; 3 lecture and 6 laboratory hours. 5 credits. A continuation of PHAR 635. (Nontraditional program)

PHAR 637 Introduction to Research Methods in Pharmaceutical Sciences Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Assists practicing pharmacist managers and researchers in the development, implementation, monitoring and evaluation of programs for the delivery of pharmaceutical care and the practice of pharmacy. Introduces students to the empirical method and to provide them with a fundamental knowledge base for formulating research questions that could lead to the articulation of testable research hypotheses, accomplished by addressing those research techniques and designs most commonly used in pharmacy and health services research.

PHAR 638 Pharmaceutical Benefit Management Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Addresses the need for pharmacy benefit management, the types of organizations that use pharmacy benefit management and the primary tools, techniques and practices used to manage the pharmacy benefit. Presents through lectures, readings, class discussions and a research paper.

PHAR 643 Pharmacotherapy I Semester course; 3 lecture and 0.5 conference hours. 3.5 credits. The pathophysiology, clinical presentation, clinical course, prevention, and pharmacotherapy of disease states are presented. The detection of drug-related problems in the provision of pharmaceutical care using problems or patient cases is introduced. Problem-solving and communication skills are enhanced in small group conferences.

PHAR 644 Pharmacotherapy II Semester course; 4 lecture and 0.5 conference hours. 4.5 credits. A continuation of PHAR 643. The use of biopharmaceutics, pharmacokinetics, clinical presentation, clinical course, prevention, and pharmacotherapy of disease states are presented. Clinical pharmacology, applied clinical pharmacology, techniques for assessing drug-related problems, monitoring and optimizing pharmacotherapy using subjective and objective patient data are emphasized. Large group discussions are introduced. Problem-solving and communication skills are enhanced in small group conferences.

PHAR 650 Evaluation of Drug Information and Information Sources Semester course; 2 lecture and 2 laboratory hours, 3 credits. A study, at the advanced-level, of the techniques used to retrieve and evaluate clinical drug literature. Research methods and research design are taught to better prepare the student and guide published research. (Nontraditional program)

PHAR 657, 658 Pharmacy Practicum III, IV Semester courses; 6 conference hours, 14 experiential hours per semester. 0.5 credit. This course focuses on the skills needed to solve problems and deliver pharmaceutical care. Skills taught in other courses and laboratory sessions will be reinforced and refined in the experience component of this course. Graded as honors or pass/fail.

PHAR 670 Geriatric Pharmacotherapy In this course, students will learn the sociobehavioral and therapeutic aspects of providing health care to elderly people. Problems associated with aging of the elderly and the importance of providing quality pharmaceutical care to ambulatory and institutionalized geriatric individuals will be emphasized.

PHAR 671 Applied Pharmacoconomics and Outcomes Research Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Presents theoretical and practical topics relating to pharmacoeconomics and health outcomes research. Students will learn to critically appraise and discuss pharmaceutical outcomes research through lectures, readings, class participation and projects. Requires students to plan, initiate and present an outcomes research project that considers both clinical and economic issues of product or service selection.

PHAR 672 Advances in Mental Health Pharmacy Practice Semester course; 2 lecture hours. 2 credits. Students choose the topics for discussion in this elective course. They actively learn through small group discussions of the practice of psychiatric disorders. Students gain experience in patient rounds, practice-based projects, interpretation of clinical practice guidelines, use of the Internet and computer presentations.

PHAR 673 Advanced Oncology Therapeutics This course builds upon material learned in Pharmacotherapy and Drug Literature Evaluation. Didactic lectures include topics such as advanced pharmacology concepts of antineoplastic agents, treatment strategies and controversies for various malignancies, the role of stem cell and bone marrow transplantation, treatment of oncology emergencies and the role of the pharmacist in cancer screening, treatment and palliative care. The experiential activities include patient care experiences and presentations for cancer-related service organizations.

PHAR 674 Advances in Community Pharmacy Practice and Therapeutics Semester course; 2 lecture and 1 conference hours. 3 credits. This course will enable students to enhance their community practice and patient care skills. It will address
strategies for marketing and documentation of clinical services including disease management, wellness and screening programs, and community pharmacy practice. Students will visit community pharmacies for the practice component of this course.

**PHAR 675 The Pharmacist's Role in Alternative Medicine**
Semester course; 3 lecture hours. 3 credits. With the expanding use of natural products and other alternative medicine modalities, the pharmacist is confronted with a need to be knowledgeable of these areas so that he or she may more effectively provide guidance to patients. This course is a study of commonly used natural products and other alternative therapies (e.g., homeotherapy, healing touch, osteopathic medicine).

**PHAR 676 Veterinary Pharmacotherapy**
Semester course; 2 lecture hours. 2 credits. This course explores the unique aspects of drug action in nonhuman species and treatment of common veterinary problems.

**PHAR 677 Infectious Diseases Pharmacotherapy**
Semester course; 3 lecture hours. 3 credits. This course is designed to familiarize the student with the important aspects of the rational treatment of human infectious diseases and will emphasize the role of the pharmacist, with the continuum of hospital pharmacy educational sessions for the professional staff. Students will learn to integrate the patient with the pharmacist in acute care setting. The course will prepare the student for an acute care rotation in cardiology.

**PHAR 681 Introduction to Pharmaceutical Industry**
Semester course; 3 lecture hours. 3 credits. This course provides an understanding of how the pharmaceutical industry has evolved, the issue it currently faces and career opportunities for pharmacists. Topical areas include drug discovery, clinical trials, regulatory approval, manufacturing, marketing, distribution and sales, the role of pharmaceutical representatives, the influence of disease management, and business and management trends. The course will be taught through a programmed textbook and presentations/discussion by guest lecturers.

**PHAR 690 Pharmacy Research Seminar**
Semester course; 1 lecture hour. 1 credit. Required of all graduate students in pharmacy. Research seminar.

**PHAR 691 Special Topics in Pharmacy**
Semester course; 1-5 lecture hours. 1-5 credits. Presentation of subject matter is by lectures, tutorial studies, and/or library assignments in selected areas of advanced study not available in other courses or as part of the research training.

**PHAR 697 Directed Research in Pharmacy**
Semester course; 1-15 credits. Research leading to the M.S., Pharm.D., or Ph.D. degree.

**PHAR 701 Pharmacy Ethics**
Semester course; 1.5 lecture hours and an average of 1 conference hour per week. 2 credits. A study of basic ethical principles and their application to the practice of pharmacy. It introduces different perspectives on approaches to addressing ethical dilemmas in pharmacy practice and presents the tools for decision making.

**PHAR 718 Pharmacy Skills Laboratory IV**
Semester course; 3 laboratory hours. 1 credit. This competency-based course challenges students in selected clinical applications in pharmacy practice.

**PHAR 724 Pharmacy Law**
Semester course; 3 lecture hours. 3 credits. A study of federal and state laws, including statutes, regulations and cases, affecting the practice of pharmacy and the distribution of drugs. This course includes material on ethics.

**PHAR 743 Pharmacotherapy III**
Semester course; 2.5 lecture and 0.5 conference hours. 3.5 credits. This course is designed to familiarize the student with the critical care pharmacist. In addition to a discussion of various disease states, information will be provided about the critically ill patient, the environment of the intensive care unit and the role of the critical care pharmacist. The course is presented in an interactive case-based discussion format.

**PHAR 748 Self-Medication Awareness and Community Health**
Semester course; 2.5 lecture and an average of 1 conference hour per week. 3 credits. This course describes and utilizes skills for assessing the necessity of using nonprescription therapy, including alternative medicines, for the management of patient symptoms encountered. Problem-solving and communication skills are emphasized. Emphasis is placed on patient interviewing techniques, physical examination skills, and the application of these skills to evaluating drug therapy and achieving desired therapeutic goals.

**PHAR 757, 758 Pharmacy Practicum V, VI**
Semester courses; 6 conference hours, 14 experiential hours per semester. 0.5 credit. Students will learn to integrate the patient care skills learned in PHAR 657-658 into the pharmaceutical care services provided to assigned patients in hospital and ambulatory settings. Students identify drug-related problems, develop and execute patient care plans to address these problems, monitor and interpret the results of these plans and document services in health records. Graded as honors or pass/fail.

**PHAR 760 Advanced Cardiovascular Pharmacotherapy**
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHAR 643. This course offers an integrated approach to the study of cardiology. Through topic discussions, case presentations and a written assignment, students will learn to treat patients with various complex cardiovascular disease states and develop a greater understanding of the role of the pharmacist in the acute care setting. This course will prepare the student for an acute care rotation in cardiology.

**PHAR 761 Advanced Therapeutics**
Semester course; 2 lecture and 2 conference hours. 3 credits. Patient cases serve as the basis for active student learning of the pharmacotherapy, clinical presentation, clinical course, prevention, and pharmacotherapy of disease states. The rational therapeutic choice of drugs with respect to multiple disease states is emphasized. Collection of patient data, assessment of drug-related problems, development of recommendations, and establishment of monitoring parameters are emphasized. Clinical application of pharmacology, biopharmaceutics, pharmacokinetics, therapeutics, drug interactions, adverse drug reactions, laboratory findings, and other factors affecting drug efficacy in the context of disease state management are stressed. Student participation in large and small group discussions is an essential component of this course.

**PHAR 774 Drug Literature Evaluation**
Semester course; 4 lecture hours. 4 credits. This course in the evaluation drug literature contains material related to biostatistics. Lecture topics include research design, concepts and principles of clinical trials, evaluation of case reports and primary literature, appropriate use of statistics, and inferential statistics (parametric and nonparametric). Exercises include efficient use of drug information resources, critique of pharmaceutical advertising and development of professional written communication skills.

**PHAR 777 Physical Assessment**
Semester course; 1 lecture hour per week. 1 credit. A study of basic physical assessment through lectures, audiovisual aids, readings, and hands-on practice. Emphasis is placed on patient interviewing techniques, physical examination skills, and the application of these skills to evaluating drug therapy and achieving desired therapeutic goals.

**PHAR 784 Self-Medication Awareness and Community Health**
Semester course; 2.5 lecture and an average of 1 conference hour per week. 3 credits. This course focuses on the pharmacists role in the pharmaceutical care services provided to assigned patients in hospital and ambulatory settings. Students identify drug-related problems, develop and execute patient care plans to address these problems, monitor and interpret the results of these plans and document services in health records. Graded as honors or pass/fail.
PHAR 761 Hospital Pharmacy Practice  
Semester course; daily for 5 weeks. 5 credits.  
In this course, students will participate in the hospital pharmacy department's delivery of pharmacy services including drug preparation, dispensing, drug distribution, administration and quality assurance. Students will participate in dosage form development, IV admixtures, unit dose dispensing, documentation, quality assurance and related services.

PHAR 762 Geriatrics Pharmacy Practice  
Semester course; daily for 5 weeks. 5 credits.  
In this course, students will participate in the delivery of care and services to patients residing in resident halls, adult homes and/or nursing homes. Student activities will include drug preparation and distribution as well as the consultant activities that include drug monitoring and review of patient care.

PHAR 763 Primary Ambulatory Care Pharmacy Practice  
Semester course; daily for 5 weeks. 5 credits.  
In this course, students will participate in the delivery of pharmaceutical care in a primary-care, multidisciplinary practice in which there is an ongoing clinical pharmacy program. These sites may include community pharmacies, hospital clinics, physician group practices and managed care facilities. Students will be involved in obtaining patient histories, evaluating drug therapies, assessing patient's response to therapy, identifying drug related problems, developing pharmacy care plans, monitoring the patient's therapeutic outcome, consulting with physician and non-physician providers and providing patient education. If this site offers dispensing services, the student will be involved with drug delivery to the patient.

PHAR 764 Community Pharmacy Practice  
Semester course; daily for 5 weeks. 5 credits.  
In this course, students will participate in all facets of pharmacy practice in the community pharmacy setting. Students will be involved in dispensing, compounding, telephone consultation, patient counselling and nonprescription drug recommendations. Students also will be involved in patient assessment, monitoring intervention and follow-up care designed to improve the outcomes of drug therapy.

PHAR 765 Clinical Elective I  
Semester course; daily for 5 weeks. 5 credits.  
In this course, students will be able to participate in a variety of pharmacy practice settings.

PHAR 766, 767 Clinical/Nonclinical Elective I  
Semester courses; daily for 5 weeks. 5 credits. In this course students participate in a variety of pharmacy practice settings.

PHAR 768 Clinical Selective  
Semester course; daily for 5 weeks. 5 credits. In this course students can choose to participate in a Primary Ambulatory Care Pharmacy Practice site or an Advanced Community Pharmacy Practice site.
School of Social Work

SLWK 601 Human Behavior in the Social Environment I
Semester course; 3 lecture hours. 3 credits.
First of two foundation courses on human behavior in the social environment. Introduces the influences of biological, psychological, spiritual, physical and socio-cultural forces on the coping efforts of individuals and social systems. Provides a multidimensional perspective on human behavior of these systems, based on theory and research findings. Examines contemporary challenges facing these systems; impact of mechanisms of oppression as well as racial, ethnic, class, cultural, disability, sexual orientation and gender diversity on human behavior; and the reciprocal nature of interactions of persons, dyads, families, social groups, communities, organizations and social institutions in a multicultural society. Introduces theoretical perspective on individuals and family development throughout life.

SLWK 602 Policy, Community and Organizational Practice I
Semester course; 3 lecture hours. 3 credits.
Corequisite: SLWK 601. First of two foundation courses on social policy, policy practice and practice in communities and organizations. Surveys historical evolution of social welfare policy and contemporary provision of social welfare services, including the role of values in policy formulation and principles of social and economic justice. Introduces the social work role as change agent in legislative, community and organizational arenas. Uses social/behavioral knowledge and social work intervention models and applies analytical frameworks for assessing program, organizational and policy effectiveness. Develops skills in identification of need, designing strategies for change, and policy analysis.

SLWK 603 Social Work and Social Justice
Semester course; 3 lecture hours. 3 credits.
Examines social work’s historical and current commitment to social justice as related to oppressed groups in a multicultural society. Enhances understanding of and appreciation for diversity in self and others. Addresses issues of power, inequality, privilege, and resulting oppression. Analyses oppression resulting from persistent social, educational, political, religious, economic, and legal inequalities. Focuses on the experiences of oppressed groups in the U.S. in order to understand their needs, and including those distinguished by race, ethnicity, gender, age, sexual orientation, disability, immigration status, and class. Considers the role of oppression faced by social workers in empowerment and advocacy roles.

SLWK 604 Social Work Practice with Individuals, Families and Groups I
Semester course; 3 lecture hours. 3 credits.
Pre- or corequisite: SLWK 601. The first of two foundation courses on social work practice with individuals, families, and groups. Defines and describes the history, context, phases and processes of direct social work practice. Explores knowledge, skills, and values necessary to provide a range of restorative, rehabilitative, maintenance and enhancement services. Emphasizes the multidimensional context in which intervention occurs. Introduces selected practice theories and models to social work with an emphasis on work with individuals.

SLWK 605 Social Work Practice with Individuals, Families and Groups II
Semester course; 3 lecture hours. 3 credits.
Prerequisites: SLWK 601 and SLWK 604. Pre- or corequisite: SLWK 610. Second of two foundation courses on social work practice with individuals, families, and groups. Extends application of beginning knowledge and skills to the phases of intervention with groups and families. Presents knowledge and skills of environmental intervention and termination. Introduces selected theories and models for social work practice with individuals, families and groups with attention to special population groups.

SLWK 606 Policy, Community and Organizational Practice II
Semester course; 3 lecture hours. 3 credits.
Prerequisites: SLWK 601 and 602. Corequisite: SLWS 610. Second of two foundation courses on social policy, policy practice and practice in communities and organizations. Examines values and ethical dilemmas facing professional social workers in organizations, communities and policy-making arenas. Explores legislative/political processes. Develops skills in legislative lobbying, advocacy, design of change strategies and tactics, policy analysis and task group leadership. Emphasizes reciprocal effects of policy on social work practice and intervention, and on generalist social work practice.

SLWK 607 Social Work Practice with Individuals, Families and Groups for Advanced-standing Students
Summer course; 2 lecture hours. 2 credits.
Prerequisites: Admission to the Advanced Standing Program and concurrent enrollment in SLWK 608, 610, 611, 612. Reviews approaches to scientific inquiry in the development of knowledge for social work practice; problem formulation; concepts and operational definitions; measurement validity and reliability; selected social work research designs; planned data collection strategies and procedures.

SLWK 610 Human Behavior in the Social Environment II
Semester course; 3 lecture hours. 3 credits.
Prerequisite: SLWK 601. Second of two foundation courses on human behavior in the social environment, covering the life course from conception through late adulthood and/or death. Includes influences of biological, psychological, physical, spiritual and sociocultural forces on individual and family coping efforts. Provides a multidimensional, multicultural perspective on the behavior of individuals and families, based on theory and research. Examines contemporary challenges facing individuals and families at various life stages. Focuses attention on the impacts of oppression, values and races through practice, cultural, disability, sexual orientation and gender diversity on human behavior; and the reciprocal nature of interactions of individuals, families and other social systems in a multicultural society.

SLWK 611 Social Work Research for Advanced-standing Students
Summer course; 2 lecture hours. 2 credits.
Prerequisites: Admission to the advanced standing program; concurrent enrollment in SLWK 607, 608, 610. Reviews approaches to scientific inquiry in the development of knowledge for social work practice; problem formulation; concepts and operational definitions; measurement validity and reliability; selected social work research designs; planned data collection strategies and procedures.

SLWK 612 Advanced-standing Field Instruction
Summer course; 3 days per week. 3 credits.
Prerequisites: Admission to the advanced standing program; concurrent enrollment in SLWK 607, 608, 610. Reviews approaches to scientific inquiry in the development of knowledge for social work practice; problem formulation; concepts and operational definitions; measurement validity and reliability; selected social work research designs; planned data collection strategies and procedures.

SLWK 693-694 Foundation Field Instruction 1-2
Continuous courses; 2 days/14 hours per week. 3-3 credits. Pre- or corequisites: SLWK 601, 602, 604, 605, 606, 610. Provides opportunities to master essential social work knowledge, values and skills through practice under the direction of an agency-based field instructor, monitored by a faculty field liaison. Emphasizes integration of content from all areas of the foundation curriculum of "PR" required for continuation from SLWK 693 to SLWK 694. Final grade of "P" required to continue in the program.

SLWK 695 Block Foundation Field Instruction
5 days a week for one semester. 6 credits.
Prerequisites: SLWK 601, SLWK 602, SLWK 603, SLWK 604, SLWK 605, SLWK 606, SLWK 609 and SLWK 610. Option for part-
time students only. Provides opportunities to master essential social work knowledge, values and skills through practice under the direct supervision of a field instructor, monitored by a faculty field liaison. Emphasizes the integration of content from all areas of the foundation curriculum. Grade of “P” required to continue in the program.

SLWK 703 Mental, Emotional and Behavioral Disorders
Semester course; 3 lecture hours. 3 credits. Prerequisites: Concentration standing. Reviews the classification, epidemiology, etiology and course of a range of mental, emotional and behavioral disorders across the life span. Emphasizes the critical analysis of existing or emerging theory, the impact of difference and diversity on the definition of dysfunction and distress, an appreciation of the "lived experience" of these disorders for clients and their families and the practical implications of knowledge for relationship building and intervention planning in social practice settings today. Introduces knowledge of psychopharmacology related to social work interventions with mental, emotional and behavioral disorders.

SLWK 704 Clinical Social Work Practice I
Semester course; 3 lecture hours. 3 credits. Pre- and/or corequisites: M.S.W. concentration standing or permission of instructor. Focuses on advanced clinical practice with individuals, families, couples, and groups. Extends knowledge and skills obtained in foundation courses. Continues a multitheoretical orientation to intervention across fields of practice with emphasis on contemporary psychodynamic and cognitive behavioral approaches and their empirical support. Emphasizes multidimensional assessment and the differential application of therapeutic, supportive, educational and resource management strategies to complex problems of children, youth, adults. Examines the interdisciplinary context of practice and the impact of diversity on clinical practice.

SLWK 705 Clinical Social Work Practice II
Semester course; 3 lecture hours. 3 credits. Prerequisite: Second of the two courses on advanced clinical practice with individuals, families, couples, and groups. Continues a multitheoretical orientation to intervention across fields of practice with emphasis on integrated family systems theory and multidimensional family assessment. Focuses on differential application of psychodynamic, cognitive-behavioral, and family systems theories to a range of complex client problems and concerns with attention to diversity of socioeconomic status, race, ethnicity, age, poverty, gender, and sexual orientation. Introduces knowledge of pharmacology related to social work intervention.

SLWK 706 Research for Clinical Social Work Practice
Semester course; 3 lecture hours. 3 credits. Prerequisites: SLWK 609 and M.S.W. concentration standing. Emphasizes further development of knowledge and skills for the scientific, analytic approach to clinical social work practice. Focuses on two parallel learning tracks: 1) application of research principles from SLWK 609 to the development of a feasible research proposal relevant to clinical social work practice; and 2) review of statistical inference and decision making, introduction to computer applications of univariate and bivariate analyses, presentation of visual and statistical techniques for single-system designs, and introduction to qualitative analytical approaches. Reviews ethical standards of scientific inquiry.

SLWK 707 Research for Clinical Social Work Practice II
Semester course; 3 lecture hours. 3 credits. Prerequisite: SLWK 706. Focuses on completion of the research project approved in SLWK 706, including data collection, development of computer program files, data analysis, preparation of final report, and presentation of findings. Provides overview of multivariate statistical analyses. Emphasizes integrating project findings into knowledge base for clinical social work.

SLWK 710 Concentration Social Policy
Semester course; 3 lecture hours. 3 credits. Prerequisite: M.S.W. concentration standing or permission of instructor. Focuses on advanced policy analysis through an in-depth, focused examination of a particular social policy area or population. Extends basic knowledge and skills of policy formulation, development, and impact analysis/evaluation, as these affect practice on behalf of clients. Examines diversity of policy sources, values, political and economic determinants; policy formulation processes; the policy basis for current services; a broad range of potential need domains, and current programs and laws. Integrates knowledge of human behavior and the social environment relevant to the focal policy areas and pays special attention to issues raised in the second year. Examines current policy issues, advocacy efforts related to these issues and practice strategies for effecting change.

SLWK 711 Strategies for Social Work Planning and Administrative Practice I
Semester course; 3 lecture hours. 3 credits. Prerequisite: M.S.W. concentration standing or permission of instructor. Develops leadership and planning skills that guide the implementation of policy and practice in community and organizational settings. Present problem-solving strategies for planning, administration and management of community and organizational contexts. Emphasizes planning context for diverse settings. Provides knowledge and skill for human and fiscal resource responsibilities, including social work research. Examines ethical and justice implications of planning and administrative practice.

SLWK 712 Social Work Planning and Administrative Practice I
Semester course; 3 lecture hours. 3 credits. Prerequisite: M.S.W. concentration standing or permission of instructor. Presents knowledge and skills for social work leadership in administering, developing and advocating social work policies and programs that are socially and economically just. Examines underlying assumptions, political, value and ethical considerations in social service planning. Provides knowledge of organizational theories and analyzes the political context of problem solving in the internal and external environments of service organizations. Focuses on community and organizational planning theories and models of intervention in assessing needs, analyzing problems, determining objectives and formulating emergent dilemmas. Emphasizes development of critical thinking and self-awareness about role responsibilities and ethical positions for organizational and community leadership at local, state, national and international levels.

SLWK 713 Social Work Planning and Administrative Practice II
Semester course; 3 lecture hours. 3 credits. Prerequisites: M.S.W. concentration standing and SLWK 712, or permission of instructor. Continues development of knowledge and skills begun in SLWK 712. Examines traditional and alternative strategies in formulating proposals to address human needs. Emphasizes multiple program designs (e.g., direct service, advocacy, staff development and training, and community empowerment programs). Incorporates understanding of policies, community, and organizational behavior and change, legislative strategies and skill. Analyzes feasibility of interorganizational partnerships and community relationships. Focuses on financial and human resource acquisition and allocation, monitoring, accountability and evaluation.

SLWK 714 Research for Social Work Administration, Planning and Policy Practice I
Semester course; 3 lecture hours. 3 credits. Prerequisites: SLWK 609 and M.S.W. concentration standing. Focuses on social work program and service evaluation including needs assessment, social indicators analysis, evidenced based practices, formative and summative evaluation designs using multiple method data collection and participatory approaches. Review of statistical inference and decision making, introduction to computer applications for qualitative data and methods for analysis of qualitative data. Application of ethical standards for evaluation involving human participants.

SLWK 715 Research for Social Work Planning and Administrative Practice II
Semester course; 3 lecture hours. 3 credits. Prerequisites: SLWK 609, SLWK 714 and second year M.S.W. program standing. Focuses on evaluation of social work programs and services including data collection, data analysis, presentation of visual and statistical techniques for qualitative and quantitative evaluation methods, and utilization of evaluation findings. Continues review of statistical inference and decision making. Emphasizes integrating evaluation findings into a knowledge base for social work administration, planning and policy practice using participatory approaches with stakeholders.

SLWK 716 Concentration Social Policy for Social Work Administration, Planning and Policy Practice
Semester course; 3 lecture hours. 3 credits. Prerequisite: M.S.W. SWAPP concentration standing or permission of instructor. Continues the examination of principles of social and economic justice. Critically analyzes traditional and alternative theories and models of the policy-making process. Demonstrates how the policy process is the core principle for decision making in agencies, communities and legislatures. Develops advanced skills in policy analysis, advocacy and policy practice including advocacy. Emphasizes the relationship and impact of economic policies on clients, communities and agencies in light of principles of social and economic justice. Analyzes current regulatory and agency policies and their implications for policy practice/advocacy for effecting change.
SLWK 717 Social Work Practice in the School Setting
Semester course; 3 lecture hours. 3 credits.
Prerequisite: M.S.W. concentration standing or permission of instructor. Emphasizes knowledge and skills of school social work practice with diverse populations in urban and rural settings. Presents historical context of social work practice and relevance to current social work practice models. Uses an ecological perspective to conceptualize the interdependence of school, family, and community and their impact on children and youth in educational settings. Critically analyzes current federal and state laws that under-gird service delivery to schools.

SLWK 718 Social Work Practice in Child Welfare
Semester course; 3 lecture hours. 3 credits.
Prerequisite: M.S.W. concentration standing or permission of instructor. Provides an overview of the history of child welfare practice in the United States. Identifies the major social, demographic, and economic changes in society that impact children and families today. Focuses on the knowledge and skills related to social work practice across a continuum of child welfare services including early intervention, family preservation, child protection, and permanency planning within the context of current practice issues. Critiques current child welfare practices and identifies the roles of a practitioner in direct child welfare service delivery.

SLWK 723 Child Neglect and Abuse: Protective Services
Semester course; 3 lecture hours. 3 credits.
Prerequisite: MSW concentration standing or permission of instructor. Focuses on theoretical and practical knowledge of the causes, definitions, and identification, reporting and investigation, and treatment of child neglect and abuse, and child sexual abuse. Analyzes family dynamics involved in physical/child neglect, abuse, and sexual abuse. Emphasizes development and enhancement of skills and the use of differential therapeutic measures.

SLWK 726 Social Work Practice and Health Care
Semester course; 3 lecture hours. 3 credits.
Prerequisite: M.S.W. concentration standing or permission of instructor. Focuses on social work in a variety of health care settings with a range of interventions from prevention and health promotion to end-of-life care. Explores ethical and legal issues and introduces frameworks for addressing ethical dilemmas. Examines the role of the social worker on an interdisciplinary team. Examines the influence of economics, political decisions, technology, changing demographics, and cultural, social and spiritual/religious experiences on individual health care decisions, access to health care, and definitions of health and illness.

SLWK 728 The Interdisciplinary Team in Social Work Practice
Semester course; 3 lecture hours. 3 credits.
Prerequisite: M.S.W. concentration standing or permission of instructor. Explores definitions and analyzes interdisciplinary team approaches. Studies the roles and functions of participants on interdisciplinary teams. Emphasizes similarities and differences between social work and other disciplines as members of teams. Explores opportunities for, and obstacles to, effective service delivery by teams.

SLWK 739 Social Work and the Law
Semester course; 3 lecture hours. 3 credits.
Prerequisite: M.S.W. concentration standing or permission of instructor. Focuses on a biopsychosocial model of mental health/illness. Focuses on up-to-date understanding of contemporary issues such as violence, racism, sexism and their impact on children, adolescents and youth in educational settings. Criticalizes current federal and state laws that under-gird service delivery to schools.

SLWK 740 Social Work Crisis Intervention and Planned Short-term Treatment
Semester course; 3 lecture hours. 3 credits.
Prerequisite: M.S.W. concentration standing or permission of instructor. The social work practice of crisis intervention and planned short-term treatment. Examines conceptual and theoretical aspects of the differential use of crisis intervention in planned short-term social work intervention. Explores directed interventions, consultation, collaboration, and service delivery issues.

SLWK 745 Social Work Practice in Community Mental Health
Semester course; 3 lecture hours. 3 credits.
Prerequisite: M.S.W. concentration standing or permission of instructor. Addresses the specialized knowledge, values, and skills needed by social workers in community mental health settings. Builds on a biopsychosocial model of mental health/illness. Focuses on up-to-date psychotherapeutic, psychosocial, and skill training approaches used with individuals, families and groups experiencing or affected by a range of mental health problems. Examines roles in interdisciplinary teamwork, case management, advocacy and medication management.

SLWK 746 Social Work Practice and Psychopharmacology
Semester course; 3 lecture hours. 3 credits.
Prerequisite: M.S.W. concentration standing or permission of instructor. Reviews the historical, political, and ethical context of psychotropic medications in social work practice. Provides a basic overview of psychopharmacology. Identifies and debates contemporary social work roles in medication management. Presents necessary social work skills for effective collaboration with clients, families and other mental health practitioners on medication-related issues.

SLWK 747 Social Work Intervention with Children and Adolescents
Semester course; 3 lecture hours. 3 credits.
Prerequisite: M.S.W. concentration standing or permission of instructor. Focuses on the role of the social worker in evaluation of change effort. Builds on the content in the foundation practice course SLWK 605 Social Work Practice with Individuals, Families and Groups.

SLWK 749 Social Work Intervention in Substance Abuse
Semester course; 3 lecture hours. 3 credits.
Prerequisite: M.S.W. concentration standing or permission of instructor. Provides an overview of the history of child welfare practice in the United States. Identifies the major social, demographic, and economic changes in society that impact children and families today. Focuses on the knowledge and skills related to social work practice across a continuum of child welfare services including early intervention, family preservation, child protection, and permanency planning within the context of current practice issues. Critiques current child welfare practices and identifies the roles of a practitioner in direct child welfare service delivery.

SLWK 750 Ethics and Social Work Practice
Semester course; 3 credits.
Prerequisite: M.S.W. concentration or Ph.D. program standing or permission of the instructor. Examines the history and development of the codes of ethics for professional practice, with special attention to the principles of human relationships, integrity, social justice and competence. Analyzes ethical dilemmas in social work practice. Considers mechanisms for the enforcement of ethical codes.

SLWK 751 Social Work Practice and AIDS
Semester course; 3 lecture hours. 3 credits.
Prerequisite: M.S.W. concentration standing or permission of instructor. Focuses on information, knowledge and skills needed to provide social work services to persons with ARC and AIDS and their families. Emphasizes epidemiological material, psychological and psychosocial aspects of AIDS and ARC for understanding the context of social policies and social work intervention. Addresses differential application of social work roles and functions.

SLWK 760 Family Theory and Therapy
Semester course; 3 lecture hours. 3 credits.
Prerequisite: M.S.W. concentration standing or permission of instructor. Presents a conceptual base for the practice of family therapy. Extends knowledge and practice for family specialists and provides a theoretical base and practice applications of family therapy for other interested students.
SLWK 760 Interpersonal Violence
Semester course; 3 lecture hours. 3 credits. Prerequisite: M.S.W. concentration standing or permission of instructor. Focuses on social workers' interpretation of personal violence, its impact on social work practice, and the social work role with victims of interpersonal violence. Topics include social work roles and responsibilities in the response to forms of interpersonal violence at the policy and practice levels. Examines both theoretical and applied responses to rape, child abuse, and elder abuse and is intended to give students knowledge about the definitions, etiology and preventive strategies with those impacted by violence.

SLWK 761 Supervision
Semester course; 3 lecture hours. 3 credits. Prerequisite: M.S.W. concentration standing or permission of instructor. Explores consultation and supervision in the evaluation of social work practice. Examines the role of consultation and supervision in the evaluation of social work practice, including knowledge base, methods, and skill in consultation and supervision. Attention to various action programs in social service delivery systems.

SLWK 769 Women's Issues and Social Work Practice
Semester course; 3 lecture hours. 3 credits. Prerequisite: M.S.W. concentration standing or permission of instructor. Explores new perspectives on women and their changing roles as these affect social work practice; direct and indirect ways sexist attitudes are acquired and conveyed; effects of changing female roles of human behavior theory and its application of new life styles including knowledge of the social work theories and their relevance to today's world; current women's issues; and the social worker's role as counselor and advocate.

SLWK 770 International Social Work Studies
Semester course; 3 lecture hours. 3 credits. Prerequisite: M.S.W. program standing. Examines social work in clinical and policy practice, social pedagogy and the social welfare system of another country that includes a field trip to the country. Examines a range of issues pertaining to the country, including: society, culture and history; social work and the social welfare system; selected social programs; social work clinical and policy practice; and comparisons of these topics between the country and the United States. Requires completion of several course units before the study abroad program.

SLWK 773 Program Evaluation
Semester course; 3 lecture hours. 3 credits. Prerequisite: M.S.W. concentration standing or permission of instructor. Focuses on the nature of theories, principles, models and methods and introduction to research methods and evaluation of social programs. Examines research design options and methodologies available for program evaluation. Explores organizational and administrative contexts in which evaluation activities are initiated, supported, disseminated, and utilized. Provides data processing and analysis of data analysis and the computer in the evaluation of social welfare programs.

SLWK 791 Topical Seminar
1.5-3 credits. Prerequisite: M.S.W. concentration standing or permission of instructor. Priorizes current social work practice issues in specialized areas of interest to social work.

SLWK 792 Independent Study
1-4 credits. Prerequisite: M.S.W. concentration standing or permission of instructor. Open with faculty approval. A maximum of four independent study courses may be included in a student's educational program. The student will be required to submit a proposal for investigating some area of interest to the student that is not ordinarily included in the regular social work curriculum. The results of the student's study will be presented in a report.

SLWK 793-794 Concentration Field Instruction
Continuous courses; 21 hours per week. 3-3 credits. Prerequisite: M.S.W. concentration standing; pre or corequisites: SLWK 703, 704-705, 706-707, 710 or SLWK 711, 712-713, 714-715, 710. Provides opportunities to master advanced social work knowledge, values and skills through practice under the direction of an advanced field instructor. Required seminar for SLWK 703, 704-705, 706-707, 710 and electives; or SLWK 711, 712-713, 714-715, 710. Provides opportunities to master advanced social work knowledge, values and skills through practice under the direction of an advanced field instructor, monitored by a faculty field liaison. Emphasizes integration of content from all areas of the concentration curriculum. Grade of "P" required for graduation. Grade of "PR" required for continuation in second semester of the practicum.

SLWK 795 Concentration Block Field Instruction
Semester fieldwork; block field instruction (option for part-time students only) 5 days a week for one semester. 6 credits. Prerequisite: M.S.W. Concentration standing; pre or corequisites: SLWK 703, 704-705, 706-707, 710 and electives, or SLWK 711, 712-713, 714-715. Provides opportunities to master advanced social work knowledge, values and skills through practice under the direction of an advanced field instructor, monitored by a faculty field liaison. Emphasizes integration of content from all areas of the concentration curriculum. Grade of "P" required for graduation.

Social Work – Doctorate

SWKD 701 Quantitative Research Methods and Analysis
Semester course; 4 credits. Prerequisite: Master's level coursework in research methods and introduction to statistics; graduate standing in social work or permission of program director. First semester of a two semester course sequence focused on concentrated study of principles of the quantitative, scientific method for knowledge building, and practice and policy related research. Special emphasis on the different stages of research methods, including problem formulation, sampling, measurement, design and data analysis. Provides opportunities to master advanced social work knowledge, values and skills through practice under the direction of an advanced field instructor, monitored by a faculty field liaison. Emphasizes integration of content from all areas of the concentration curriculum. Grade of "P" required for graduation.

SWKD 702 Quantitative Research Methods and Analysis II
Semester course; 4 credits. Prerequisite: Master's level coursework in research methods and introduction to statistics; graduate standing in social work or permission of program director. Second of a two-semester course sequence focused on concentration study of principles of quantitative, scientific method for knowledge building, and practice and policy related research. Special emphasis is placed on the application of descriptive and inferential statistical techniques within the context of applied social work research.

SWKD 703 Philosophical Issues in Social Work Knowledge Building
Semester course; 3 lecture hours. 3 credits. Prerequisite: Admission to Ph.D. in social work or permission of program director. This seminar focuses on assisting seminar participants to develop and refine their understanding of the logical foundations and the empirical bases of the social work practice discipline and the processes of inquiry in science. Of particular focus will be the social sciences including social work using a paradigmatic perspective, the seminar will investigate the epistemological, ontological and methodological implications for knowledge building for social work.

SWKD 704 Multiparadigmatic Qualitative Methods and Analysis
3 credits. Focuses on assisting participants to develop and refine their understanding of, and skills in, qualitative research from multiple paradigmatic perspectives. Investigates a variety of qualitative strategies that allow for an understanding of the social work phenomena by theory building, theory testing or constructing meaning. Emphasis will be on a range of qualitative methods for collecting empirical material, and the epistemological analysis of those data, including the use of computer analysis.

SWKD 708 Social and Behavioral Science Foundations for Social Work
Semester course; 3 credits. Prerequisite: Admission to the Ph.D. program in social work or permission of program director. This doctoral seminar focuses on theories and conceptual approaches used as the knowledge base of social work. Emphasis is given to developing the abilities of students in identifying the essential elements of theory, determining the knowledge building purposes of theory, and articulating the rationale for selection of theories as a basis for scholarly inquiry. In addition, theories are critically evaluated for their implicit assumptions, values, empirical support and potential usefulness. Theories covered will be drawn from the social and behavioral sciences with an emphasis on those appropriate for the social change and social justice concerns of social work.

SWKD 710 Social Work, Social Welfare and Social Thought
Semester course; 3 lecture hours. 3 credits. Prerequisite: Doctoral program admission or permission of instructor. Required seminar for social work doctoral students. Examines social work and its roles and functions in relation to contemporary social problems, social policy and social work practice interventions that provide solutions to these problems. Analysis of issues of social welfare and the social work profession relating to structure, functions and history of values, ethics, professional standards and concern for social justice. Designed to foster a critical perspective on the profession in its environment and provide grounding in the historical and cultural traditions and major streams of social thought influencing the profession, its development, and the American system of social welfare.

SWKD 715 Development and Evaluation of Social Work Practice Theories and Models
Semester course; 3 lecture hours. 3 credits. A required seminar for first year doctoral students that is sequential to and builds upon prerequisite first year theory and research courses. It focuses on the nature of theories, models and perspectives that guide social work practice.
work practice. It includes historical and philosophical foundations of practice theories and frameworks to evaluate practice theory through the lens of social justice. Practice theories include all social work theories whose aim is change. The focus of change may at the individual, diad, family, group, community, organizational, policy, and systems levels. Criteria for the selection of the level of the focus of change will be explored.

**SWKD 723 Social Work Education: Issues in Teaching**
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing in social work or permission of the program director. Focus is on two central and integrated components of professional education: (1) examination of the development and dimensions of social work education and (2) exploration of theories of learning and teaching within the framework of professional social work education.

**SWKD 724 Social Work Models for Social Policy Analysis and Implementation**
Semester course; 3 lecture hours. 3 credits. Prerequisite: Completion of core curriculum.

Selected social work models for social policy analysis. Examination of social work roles and functions in relation to social policy formulation, administration, and evaluation. Examination of historical and current social policy issues in selected social problem areas from the perspective of social work values, ethics, and professional standards.

**SWKD 791 Topical Seminar**
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisite: Permission of instructor. Study of the current state of knowledge and research within a specialized area of concern to social policy and social work.

**SWKD 792 Independent Study**
Semester course; 1, 2 or 3 credits. May be repeated for a maximum of 6 credits, that count toward the 36 required credits. May then be taken for an additional 1-12 credits to accommodate the need for continuous enrollment required of all students between completion of required course work and passage of the comprehensive examinations. Prerequisite: Permission of the program director. Independent reading and study in selected areas under the supervision of a member of the faculty.

**SWKD 797 Directed Research**
Semester course; 3 credits. Pre-dissertation research project under faculty supervision.

**SWKD 898 Dissertation Research**
Semester course; 1-18 credits. May be repeated for credit. May be taken for additional credits until dissertation is accepted formally. Prerequisite: Successful completion of comprehensive examinations or permission of program director. Students are required to complete 18 credit hours.